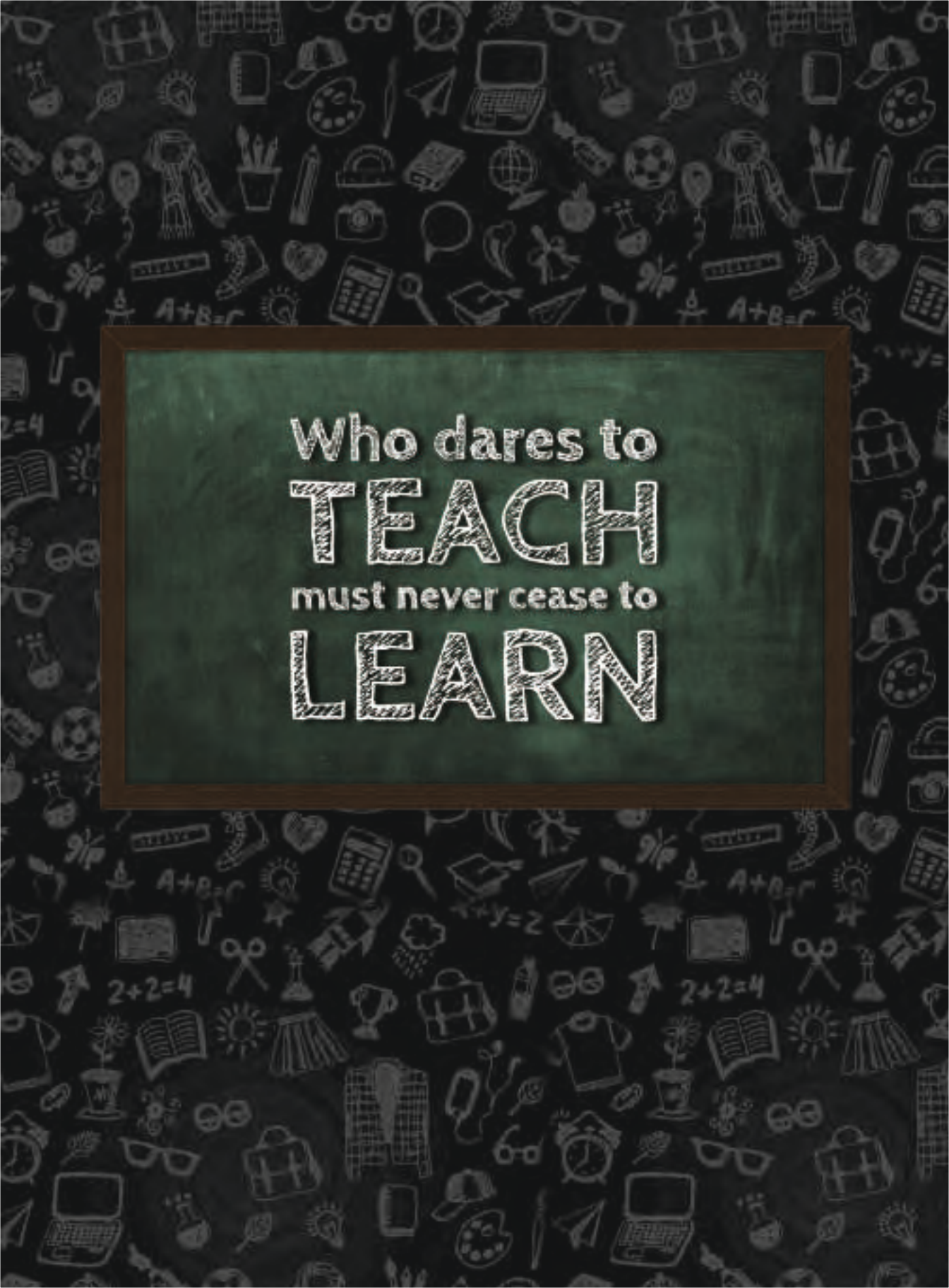
Who dares to
TEACH
must never cease to
LEARN

An inspiring collection of Learning Resources for educators

Contents

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Totto-chan

Tetsuko Kunoyanagi

The Little Girl at the Window

The reason Mother was worried was because although Totto-chan had only just started school, she had already been expelled. Fancy being expelled from the first grade!

It had happened only a week ago. Mother had been sent for by Totto-chan's homeroom teacher, who came straight to the point. "Your daughter disrupts my whole class. I must ask you to take her to another school." The pretty young teacher sighed, "I'm really at the end of my tether."

Mother was completely taken aback. What on earth did Totto-chan do to disrupt the whole class, she wondered!

Blinking nervously and touching her hair, cut in a short pageboy style, the teacher started to explain. "Well, to begin with, she opens and shuts her desk hundreds of times. I've said that no one is to open or shut their desk unless they have to take something out or put something away. So your daughter is constantly taking something out and putting something away—taking out or putting away her notebook, her pencil box, her textbooks, and everything else in her desk. For instance, say we are going to write the alphabet, your daughter opens her desk, takes out her notebook, and bangs the top down. Then she opens her desk again, puts her head inside, gets out a pencil, quickly shuts the desk, and writes an 'A'. If she's written it badly or made a mistake she opens the desk again, gets out an eraser, shuts the desk, erases the letter, then

opens and shuts the desk again to put away the eraser—all at top speed. When she's written the 'A' over again, she puts every single item back into the desk, one by one. She puts away the pencil, shuts the desk, then opens it again to put away the notebook. Then, when she gets to the next letter, she goes through it all again—first the note-book, then the pencil, then the eraser—opening and shutting her desk every single time. It makes my head spin. And I can't scold her because she opens and shuts it each time for a reason."

The teacher's long eyelashes fluttered even more as if she were reliving the scene in her mind.

It suddenly dawned on Mother why Totto-chan opened and shut her desk so often. She remembered how excited Totto-chan had been when she came home from her first day at school. She had said, "School's wonderful! My desk at home has drawers you pull out, but the one at school has a top you lift up. It's like a box, and you can keep all sorts of things inside. It's super!"

Mother pictured her delightedly opening and shutting the lid of this new desk. And Mother didn't think it was all that naughty either. Anyway, Totto-chan would probably stop doing it as soon as the novelty wore off. But all she said to the teacher was, "I'll speak to her about it."

The teacher's voice rose in pitch as she continued, "I wouldn't mind if that was all."

Mother flinched as the teacher leaned forward. "When she's not making a clatter with her desk, she's standing up. All through class!"

"Standing up! Where?" asked Mother, surprised.

"At the window," the teacher replied crossly.

"Why does she stand at the window?" Mother asked, puzzled.

"So she can invite the street musicians over!" she almost shrieked.

The gist of the teacher's story was that after an hour of almost constantly banging her desk top, Totto-chan would leave her desk and stand by the window, looking out. Then, just as the teacher was beginning to think that as long as she was quiet she might just as well stay there, Totto-chan would suddenly call out to a passing band of garishly dressed street musicians. To Totto-chan's delight and the teacher's tribulation, the classroom was on the ground floor looking out on the street. There was only a low hedge in between, so anyone in the classroom could easily talk to people going by. When Totto-chan called to them, the street musicians would come right over to the window. Whereupon, said the teacher, Totto-chan would announce the fact to the whole room, "Here they are!" and all the children would crowd by the window and call out to the musicians.

"Play something," Totto-chan would say, and the little band, which usually passed the school quietly, would put on a rousing performance for the pupils with their clarinet, gongs, drums, and samisen, while the poor teacher could do little but wait patiently for the din to stop.

Finally, when the music finished, the musicians would leave and the students would go back to their seats. All except Totto-chan. When the teacher asked, "Why are you still at the window?" Totto-chan replied, quite seriously, "Another band might come by. And, anyway, it would be such a shame if the others came back and we missed them."

"You can see how disruptive all this is, can't you?" said the teacher emotionally. Mother was beginning to sympathise with her when she began again in an even shriller voice, "And then, besides..."

"What else does she do?" asked Mother, with a sinking feeling.

"What else?" exclaimed the teacher. "If I could even count the things she does I wouldn't be asking you to take her away."

The teacher composed herself a little, and looked straight at Mother. "Yesterday, Totto-chan was standing at the window as usual, and I went on with the lesson thinking she was just waiting for the street musicians, when she suddenly called out to somebody, 'What are you doing!' From where I was I couldn't see who she was taking to, and I wondered what was going on. Then she called out again, 'What are you doing!' She wasn't addressing anyone in the road but somebody high up somewhere. I couldn't help being curious, and tried to hear the reply, but there wasn't any. In spite of that, your daughter kept on calling out, 'What are you doing?' so often I couldn't teach, so I went over to the window to see who your daughter was talking to. When I put my head out of the window and looked up, I saw it was a pair of swallows making a nest under the classroom eaves. She was talking to the swallows! Now, I understand children, and so I'm not saying that talking to swallows is nonsense. It is just that I feel it is quite unnecessary to ask swallows what they are doing in the middle of class."

Before Mother could open her mouth to apologize, the teacher went on, "Then there was the drawing class episode. I asked the children to draw the Japanese flag, and all the others drew it correctly but your daughter started drawing the navy flag - you know the one with the rays. Nothing wrong with that, I thought. But then she suddenly started to draw a fringe all around it. A fringe! You know, like those fringes on youth group banners. She's probably seen one somewhere. But before I realized what she was doing, she had drawn a yellow fringe that went right off the edge of the paper and onto her desk. You see, her flag took up most of the paper, so there wasn't enough room for the fringe. She took her yellow crayon and all around her flag she made hundreds of

strokes that extended beyond the paper, so that when she lifted up the paper her desk was a mass of dreadful yellow marks that wouldn't come off no matter how hard we rubbed. Fortunately, the lines were only on-three sides."

Puzzled, Mother asked quickly, "What do you mean, only three sides!"

Although she seemed to be getting tired, the teacher was kind enough to explain. "She drew a flagpole on the left, so the fringe was only on three sides of the flag."

Mother felt somewhat relieved. "I see, only on three sides."

Whereupon the teacher said very slowly, emphasizing each word, "But most of the flagpole went off the paper, too, and is still on the desk as well."

Then the teacher got up and said coldly, as a sort of parting shot, "I'm not the only one who is upset. The teacher in the classroom next door has also had trouble."

Mother obviously had to do something about it. It wasn't fair to the other pupils. She'd have to find another school, a school where they would understand her little girl and teach her how to get along with other people.

The school they were on their way to was one Mother had found after a good deal of searching.

Mother did not tell Totto-chan she had been expelled. She realized Totto-chan wouldn't understand what she had done wrong and she didn't want her to get any complexes, so she decided not to tell Totto-chan until she was grown-up. All Mother said was, "How would you like to go to a new school! I've heard of a very nice one."

"All right," said Totto-chan, after thinking it over.

"But..."

"What is it now?" thought Mother. "Does she realize she's been expelled?"

But a moment later Totto-chan was asking joyfully, "Do you think the street musicians will come to the new school?"

Eurythmics

After summer vacation was over, the second semester began, for in Japan the school year starts in April. In addition to the children in her own class, Totto-chan had made friends with all the older boys and girls, thanks to the various gatherings during summer vacation. And she grew to like Tomoe Gakuen even more.

Besides the fact that classes at Tomoe were different from those at ordinary schools, a great deal more time was devoted to music. There were all sorts of music lessons, which included a daily period of eurythmics—a special kind of rhythmic

education devised by a Swiss music teacher and composer, Emile Jaques-Dalcroze. His studies first became known about 1904. His system was rapidly adopted all over Europe and America and training and research institutes sprang up everywhere. Here is the story of how Dalcroze's eurhythmics came to be adopted at Tomoe.

Before starting Tomoe Gakuen, the headmaster, Sosaku Kobayashi, went to Europe to see how children were being educated abroad. He visited a great many elementary schools and talked to educators. In Paris, he met Dalcroze, a fine composer as well as an educator.

Dalcroze had spent a long rime wondering how children could be taught to hear and feel music in their minds lather than just with their ears; how to make them feel music as a thing of movement rather than a dull, lifeless subject; how to awaken a child's sensitivity.

Eventually, after watching the way children jumped and skipped and romped about, he hit on the idea of creating rhythmic exercises, which he called eurythmics.

Kobayashi attended the Dalcroze school in Paris for over a year and learned this system thoroughly. Many Japanese have been influenced by Dalcroze—the composer Koscak Yamada; the originator of modern dance in Japan, Baku Ishii; the Kabuki actor Ichikawa Sadanji II; the modern drama pioneer Kaoru Osannai; the dancer Michio Ito. All of these people felt that Dalcroze's teachings were fundamental to many of the arts. But Sosaku Kobayashi was the first to apply it to elementary education in Japan.

If you asked him what eurythmics was, he would reply, "It's a sport that refines the body's mechanism; a sport that teaches the mind how to use and control the body; a sport that enables the body and mind to understand rhythm. Practicing eurythmics makes the personality rhythmical. And a rhythmical personality is beautiful and strong, conforming to and obeying the laws of nature."

Totto-chan's classes began with training the body to understand rhythm. The headmaster would play the piano on the small stage in the Assembly Hall and the children, wherever they stood, would start walking in time to the music. They could walk in whatever manner they liked, except that it wasn't good to bump into others, so they tended to go in the same circular direction. If they thought the music was in two-beat time, they would wave their arms up and down, like a conductor, as they walked. As for their feet, they were not supposed to tramp heavily, but that didn't mean they were to walk with toes pointed either, as in ballet. They were told to walk completely relaxed, as if they were dragging their toes. The most important thing was naturalness, so they could walk in any way they felt was right. If the rhythm changed to three-beat time, they waved their arms accordingly and adjusted their pace to the tempo, walking faster or slower as required. They had to

learn to raise and lower their arms to fit rhythms up to six-beat time.

Four-beat time was simple enough: "Down, around you, out to the sides, and up."

But when it came to five beats it was: "Down, around you, out in front, out to the sides, and up."

While for six beats, the arms went: "Down, around you, out in front, around you again, out to the sides, and up."

So when the beat kept changing it was pretty difficult. What was even harder was when the headmaster would call out: "Even if I change my tempo on the piano don't you change until I tell you to!"

Suppose they were walking in two-beat time and the music changed to three beats, the children had to keep on walking in duple time while heating the triple rhythm. It was very hard, but the headmaster said it was to cultivate the children's powers of concentration.

Finally he would shout, "You can change now!"

With relief, the children would immediately change to the triple rhythm. But that was when they had to be especially alert. In the time it took to mentally abandon the two beats and get the message to their muscles to adapt to three beats, the music might suddenly change to five-beat time! At first, their arms and legs were all over the place and there would be groans of "Teacher, wait! wait!" But with practice, the movements became pleasant to do, and the children even thought up variations and enjoyed themselves.

Usually each child moved individually, but sometimes a pair would decide to act in unison, holding hands when the rhythm was in two-beat time; or they would try walking with their eyes closed. The only thing that was taboo was conversation.

Sometimes, when there was a parent-teacher association meeting the mothers would peek in through the window. It was lovely to watch—each child moving arms and legs with ease, leaping about joyfully, in perfect time to the music.

Thus, the purpose of eurythmics was first to train both mind and body to be conscious of rhythm, thereby achieving harmony between the spirit and the flesh, and finally awakening the imagination and promoting creativity.

The day she arrived at the school for the very first time, Totto-chan had looked at the name on the gate and asked Mother, "What does Tomoe mean?"

The tomoe is an ancient comma-shaped symbol, and for his school the headmaster had adopted the traditional emblem consisting of two tomoe—one black and one white—united to form a perfect circle. This symbolized his aim for the children: body and mind equally developed and in perfect harmony.

The headmaster had included eurythmics in his school curriculum because he felt it was bound to have good results and help the children's personalities to grow naturally, without being affected by too much adult interference.

The headmaster deplored contemporary education, with its emphasis on the written word, which tended to atrophy a child's sensual perception of nature and intuitive receptiveness to the still small voice of God, which is inspiration.

It was the poet Basho who wrote:

Listen! a frog
Jumping into the silence
Of an ancient pond!

Yet the phenomenon of a frog jumping into a pond must have been seen by many others. Down through the ages and in the whole world, Watt and Newton cannot have been the only ones to notice the steam from a boiling kettle or observe an apple fall.

Having eyes, but not seeing beauty; having ears, but not hearing music; having minds, but not perceiving truth; having hearts that are never moved and therefore never set on fire. These are the things to fear, said the headmaster.

As for Totto-chan, as she leaped and ran about in her bare feet, like Isadora Duncan, she was tremendously happy and could hardly believe that this was part of going to school!

Excerpts from Totto-chan the landmark bestseller on education written by famous Japanese television personality, Tetsuko Kunoyanagi and translated from the Japanese by Dorothy Britton. The book is a childhood memoir about the values of the unconventional education that Tetsuko a.k.a. Totto received at Tomoe Gakuen, an elementary school founded in Tokyo during World War II by the progressive educator, Sosaku Kobayashi.

The complete book may be downloaded from ***www.arvindguptatoys.com/arvindgupta/Tottochan.pdf***

Tribute to a Teacher

Arvind Gupta

Oriental societies always held their teachers in high esteem. The teachers were given to simple living and high thinking. They did not have many worldly goods but true "gurus" were always deeply respected. But slowly this social respectability to teachers is also eroding. In Germany a primary school teacher is treated like a civil servant. S/he is accorded a high social status.

But what is the social standing of a primary school teacher in our government school? Today s/he would stand at the very bottom of the social ladder – way below the peons and security guards. The uniform and arms lend the latter a semblance of power. The teacher carries no such symbol of authority. Teachers often work for long hours under tough conditions for a paltry pay. Despite their arduous circumstances many still do a wonderful job. What is the secret of becoming a good teacher?

Perceptive schools interested in good education always look for certain key attributes in teachers. They are suspicious of paper degrees but look for more tangible skills. While interviewing potential teachers apart from the academic qualifications they look seriously at their extra-curricular interests. Apart from knowing the subject someone who is interested in music, wildlife, astronomy, common trees or good literature – someone who pursues a passionate hobby is more likely to be a good teacher. After the initial euphoria and idealism has vaporized, the going for a new teacher can get tough. The task of teaching, correcting assignments, filling scores of registers and shouldering other onerous responsibilities, day in and day out can become nerve breaking. The task of a conscientious teacher is not easy. S/he will go nuts. This is when the teacher's passions, hobbies will sustain her. The genuine interest she has in music, books, etc. would provide the nurturance for her soul.

The school is a government unto itself – full of rules and regulations. A good teacher deals with them by creating her own private space – a sacred bond between her and the children. Why waste time on taking attendance? Instead spend time on something more inspiring. Why spend time on inspecting the uniform and doing other policing chores? Instead spend it something more tangible. Free children often express their joy of learning through a good laugh or roar. The other teachers brainwashed into authoritarianism may not like it. So, a clever teacher shuts her classroom doors!

Many teachers get into a "soup" by acting as know-alls. There is a "banking" model of education where the teacher is portrayed as a "jug" full of knowledge and the children as "empty" cups. The task of the teacher is pour knowledge into these empty cups. But true learning is far removed from this mechanistic schema. In real life, children understand best what they reconstruct themselves. So, a good teacher must be a fellow traveller - learning as well as teaching the children. S/he is always willing to say, "I don't know the answer, let's explore it together." David Horsburgh – the creative educationist who set up the Neelbagh School would often ask trainee teachers from North India to teach the children Hindi and learn Telugu from them. The children could see their teacher's struggle with Telugu, which was akin to their own struggle with Hindi. This produced a bond of deep empathy between teacher and the children and made the teacher more humane. Both children and teacher learnt.

Every child learns to talk and communicate before s/he goes to school. This stupendous skill is learnt without being taught. Most children have a 'gleam in their eye' before they go to school. But soon this gargantuan combination of education and bureaucracy fails them. Schools replicate the power structures of the larger society of which they are a part. Uniform, assembly, protocol, attendance, homework, tests, exams define a school. But all these rituals have very little to do with real learning. Obedience, discipline, pin-drop silence and regimentation seem to be the rule in most schools. We do not need enormous centralised schools in order to have quality education. This is the reverse of what we have been told and sold. All over the country we have destroyed small schools in which it might at least have been possible for teachers to do some of the things, which Gijubhai Badheka did. In their place we have built giant school-factories, which we run, for the most part, like armies and prisons because they seem too big to be run like anything else. The idea behind this was that in small schools we could not afford to have the kinds of equipment, material and specialised teachers that we thought we needed to get enough variety and depth in the children's learning.

Changes in the school system—if they are to be of lasting significance—must spring from the actions of teachers in their classrooms, teachers who are able to help children live creatively. New programmes, new materials, and even basic changes in organisational structure will not necessarily bring about healthy growth. A dynamic and vital atmosphere can develop when teachers are given the freedom and support to innovate. One must depend ultimately upon the initiative and resourcefulness of such teachers and this cannot be promoted by prescribing continuously and in detail what is to be done. In education we cry too much about money. Sure, we could use more; but some of the best classrooms and schools

I have seen or heard of, spend far less per pupil than the average in our schools today. We often don't spend well what money we have. We waste large sums on fancy buildings, unproductive administrative staff, on diagnostic and remedial specialists, on expensive equipment that is either not needed, or under used, or badly misused, on tons of identical and dull textbooks, readers and workbooks, and now on gee-whiz devices like computers. For much less than what we do spend, we could make our classrooms into far better learning environments than most of them are today.

Arvind Gupta is an Indian toy inventor and populariser of science. An alumnus of IIT Kanpur, he has won many awards for making science fun for children. The mission of reaching books to each and every child in the country is close to his heart. In addition to authoring numerous books on activity based learning, he has also translated numerous seminal works into Hindi. Arvind Gupta's TED Talk: Turning Trash into Toys for Learning is amongst the best TED Talks on Education. He shares his passion for science and books through his popular website www.arvindguptatoys.com.

Every kid needs a champion

Rita F. Pierson

I have spent my entire life either at the schoolhouse, on the way to the schoolhouse, or talking about what happens in the schoolhouse.

Both my parents were educators, my maternal grandparents were educators, and for the past 40 years, I've done the same thing. And so, needless to say, over those years I've had a chance to look at education reform from a lot of perspectives. Some of those reforms have been good. Some of them have been not so good. And we know why kids drop out. We know why kids don't learn. It's either poverty, low attendance, negative peer influences... We know why. But one of the things that we never discuss or we rarely discuss is the value and importance of human connection. Relationships.

James Comer says that no significant learning can occur without a significant relationship. George Washington Carver says all learning is understanding relationships. Everyone in this room has been affected by a teacher or an adult. For years, I have watched people teach. I have looked at the best and I've looked at some of the worst.

A colleague said to me one time, "They don't pay me to like the kids. They pay me to teach a lesson. The kids should learn it. I should teach it, they should learn it, Case closed."

Well, I said to her, "You know, kids don't learn from people they don't like."

She said, "That's just a bunch of hooey."

And I said to her, "Well, your year is going to be long and arduous, dear."

Needless to say, it was. Some people think that you can either have it in you to build a relationship, or you don't. I think Stephen Covey had the right idea. He said you ought to just throw in a few simple things, like seeking first to understand, as opposed to being understood. Simple things, like apologizing. You ever thought about that? Tell a kid you're sorry, they're in shock.

I taught a lesson once on ratios. I'm not real good with math, but I was working on it.

And I got back and looked at that teacher edition. I'd taught the whole lesson wrong.

So I came back to class the next day and I said, "Look, guys, I need to apologize.

I taught the whole lesson wrong. I'm so sorry."

They said, "That's okay, Ms. Pierson. You were so excited, we just let you go."

I have had classes that were so low, so academically deficient, that I cried. I wondered, 'How am I going to take this group, in nine months, from where they are to where they need to be?' And it was difficult, it was awfully hard. How do I raise the self-esteem of a child and his academic achievement at the same time?

One year I came up with a bright idea. I told all my students, "You were chosen to be in my class because I am the best teacher and you are the best students, they put us all together so we could show everybody else how to do it."

One of the students said, "Really?"

I said, "Really. We have to show the other classes how to do it, so when we walk down the hall, people will notice us, so you can't make noise. You just have to strut."

And I gave them a saying to say: "I am somebody. I was somebody when I came. I'll be a better somebody when I leave. I am powerful, and I am strong. I deserve the education that I get here. I have things to do, people to impress, and places to go."

And they said, "Yeah!"

You say it long enough, it starts to be a part of you.

I gave a quiz, 20 questions. A student missed 18. I put a '+2' on his paper and a big smiley face.

He said, "Ms. Pierson, is this an F?"

I said, "Yes."

He said, "Then why'd you put a smiley face?"

I said, "Because you're on a roll. You got two right. You didn't miss them all."

I said, "And when we review this, won't you do better?"

He said, "Yes, ma'am, I can do better."

"You see, '-18' sucks all the life out of you. '+2'," said I, "ain't all bad."

For years, I watched my mother take the time at recess to review, go on home visits in the afternoon, buy combs and brushes and peanut butter and crackers to put in her desk drawer for kids that needed to eat, and a washcloth and some soap for the kids who didn't smell so good. See, it's hard to teach kids who stink.

And kids can be cruel. And so she kept those things in her desk, and years later, after she retired, I watched some of those same kids come through and say to her, "You know, Ms. Walker, you made a difference in my life. You made it work for me. You made me feel like I was somebody, when I knew, at the bottom, I wasn't. And I want you to just see what I've become."

And when my mama died two years ago at 92, there were so many former students at her funeral, it brought tears to my eyes, not because she was gone, but because she left a legacy of relationships that could never disappear.

Can we stand to have more relationships? Absolutely. Will you like all your children? Of course not.

And you know your toughest kids are never absent.

Never. You won't like them all, and the tough ones show up for a reason. It's the connection. It's the relationships. So teachers become great actors and great actresses, and we come to work when we don't feel like it, and we're listening to policy that doesn't make sense, and we teach anyway. We teach anyway, because that's what we do.

Teaching and learning should bring joy. How powerful would our world be if we had kids who were not afraid to take risks, who were not afraid to think, and who had a champion? Every child deserves a champion, an adult who will never give up on them, who understands the power of connection, and insists that they become the best that they can possibly be.

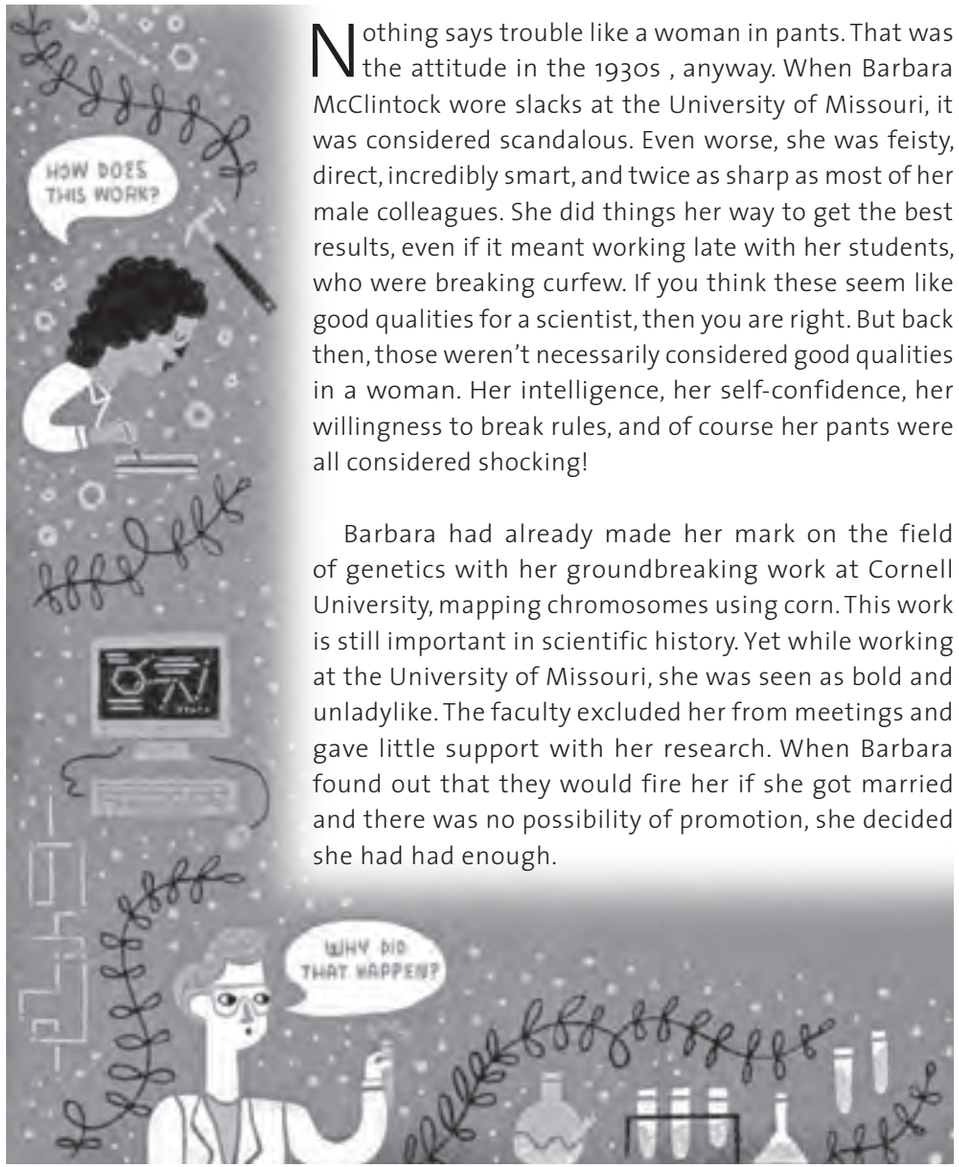
Is this job tough? You betcha. Oh God, you betcha. But it is not impossible. We can do this. We're educators. We're born to make a difference.

Rita F. Pierson, a professional educator since 1972, taught elementary school, junior high and special education. She was a counselor, a testing coordinator and an assistant principal. In each of these roles, she brought a special energy to the role—a desire to get to know her students, show them how much they matter and support them in their growth, even if it was modest.

Transcript of a TED Talk delivered in May 2013. It may be viewed through the link: https://www.ted.com/speakers/rita_f_pierson

Women in Science

Rachel Ignotofsky



Nothing says trouble like a woman in pants. That was the attitude in the 1930s , anyway. When Barbara McClintock wore slacks at the University of Missouri, it was considered scandalous. Even worse, she was feisty, direct, incredibly smart, and twice as sharp as most of her male colleagues. She did things her way to get the best results, even if it meant working late with her students, who were breaking curfew. If you think these seem like good qualities for a scientist, then you are right. But back then, those weren't necessarily considered good qualities in a woman. Her intelligence, her self-confidence, her willingness to break rules, and of course her pants were all considered shocking!

Barbara had already made her mark on the field of genetics with her groundbreaking work at Cornell University, mapping chromosomes using corn. This work is still important in scientific history. Yet while working at the University of Missouri, she was seen as bold and unladylike. The faculty excluded her from meetings and gave little support with her research. When Barbara found out that they would fire her if she got married and there was no possibility of promotion, she decided she had had enough.

Risking her entire career, she packed her bags. With no plan, except an unwillingness to compromise her worth, Barbara went off to find her dream job. This decision would allow her to joyously research all day and eventually make the discovery of jumping genes. This discovery would win her a Nobel Prize and forever change how we view genetics.

Barbara McClintock's stiry is not unique. As long as humanity has asked questions about our world, men and women have looked to the stars, under rocks, and through microscopes to find the answers. Although both men and women have the same thirst for knowledge, women have not always been given the same opportunities to explore the answers.

In the past, restrictions on women's access to education were not uncommon. Women were often not allowed to publish scientific papers. Women were expected to grow up exclusively to become good wives and mothers while their husbands provided for them. Many people thought women were just not as smart as men. As a result women had to fight these stereotypes to have careers they wanted. They broke rules, published under pseudonyms, and worked for the love of learning alone. when others doubted their abilities, they had to believe in themselves.

When women finally began gaining wider access to higher education, there was usually a catch. Often they would be given no space to work, no funding, and no recognition. Not allowed to enter the university because of her gender, Lise Meitner did her radiochemistry experiments in a dank basement. Without funding for a lab, physicist and chemist Marie Curie handled dangerous radioactive elements in tiny, dusty shed. Lilian Gilbreth, a pioneer in organizational psychology, could not even earn a byline in the books

she coauthored with Frank Gilberth because the publishers thought a male author would appear more credible. After making one of the most important discoveries in the history of astronomy, Cecilia Payne-Gaposchkin still got little recognition, and for decades her gender limited her to work as a technical assistant. Creativity, persistence, and a love for discovery were the greatest tools these women had.

Marie Curie is now a household name, but throughout history there have been many other great and important women in the fields of science, technology, engineering, and mathematics (STEM). Many did not receive the recognition they deserved at the time and were forgotten. When thinking of physics, we should name not only Albert Einstein but also the genius mathematician Emmy Noether, who taught for 7 years at the University of Gottingem, without pay or title, a subject she had painstakingly learnt by sneaking in at the back of the class and by crusading for 2 years before she was accepted as a student at the university. We should all know that it was Rosalind Franklin who discovered the double helix structure of DNA, not James Watson and Francis Crick. While admiring the advances in computer technology, let us remember not only Steve Jobs or Bill Gates, but also Grace Hopper, the creator of modern programing.

Women make up half the world's population and we simply cannot afford to ignore that brain power on which the progress of humankind depends. Throughout history many women have risked everything in the name of science. So let us remember that 'the progressive woman' is not a recent trend. Since ancient times, there have been umpteen female scientists who in the face of "No" said, "Try and stop me."

The Introduction of a charmingly illustrated and educational book, ***Women in Science,*** *which highlights the contributions of fifty notable women to the fields of STEM from the ancient to the modern world.*

Teachers need real life feedback

Bill Gates

Everyone needs a coach. It doesn't matter whether you're a basketball player, a tennis player, a gymnast or a bridge player.

We all need people who will give us feedback. That's how we improve. Unfortunately, there's one group of people who get almost no systematic feedback to help them do their jobs better, and these people have one of the most important jobs in the world. I'm talking about teachers. When Melinda and I learned how little useful feedback most teachers get, we were blown away. Until recently, over 98 percent of teachers just got one word of feedback: Satisfactory. If all my bridge coach ever told me was that I was "satisfactory", I would have no hope of ever getting better. How would I know who was the best? How would I know what I was doing differently? Today, districts are revamping the way they evaluate teachers, but we still give them almost no feedback that actually helps them improve their practice. Our teachers deserve better. The system we have today isn't fair to them. It's not fair to students.. So today I want to talk about how we can help all teachers get the tools for improvement they want and deserve.

Let's start by asking who's doing well. Well, unfortunately there's no international ranking table for teacher feedback systems. So I looked at the countries whose students perform well academically, and looked at what they're doing to help their teachers improve. Consider the rankings for reading proficiency.

The U.S. isn't number one. We're not even in the top 10. We're tied for 15th with Iceland and Poland. Now, out of all the places that do better than the U.S. in reading, how many of them have a formal system for helping teachers improve? 11 out of 14. The U.S. is tied for 15th in reading, but we're 23rd in science and 31st in math. So there's really only one area where we're near the top, and that's in failing to give our teachers the help they need to develop their skills.

Let's look at the best academic performer: the province of Shanghai, China. Now, they rank number one across the board, in reading, math and science, and one of the keys to Shanghai's incredible success is the way they help teachers keep improving. They made sure that younger teachers get a chance to watch master teachers at work. They have weekly study groups, where teachers get together and talk about what's working. They even require each teacher to observe and give feedback to their colleagues.

You might ask why is a system like this so important? It's because there's so much variation in the teaching profession. Some teachers are far more effective than others. In fact, there are teachers throughout the country who are helping their students make extraordinary gains. If today's average teacher could become as good as those teachers, our students would be blowing away the rest of the world. So we need a system that helps all our teachers be as good as the best.

What would that system look like? Well, to find out, our foundation has been working with 3,000 teachers in districts across the country on a project called Measures of Effective Teaching (MET). We had observers watch videos of teachers in the classroom and rate how they did on a range of practices. For example, did they ask their students challenging questions? Did they find multiple ways to explain an idea? We also had students fill out surveys with questions like, "Does your teacher know when the class understands a lesson?" "Do you learn to correct your mistakes?"

And what we found is very exciting. First, the teachers who did well on these observations had far better student outcomes. So it tells us we're asking the right questions. And second, teachers in the programme told us that these videos and these surveys from the students were very helpful diagnostic tools, because they pointed to specific places where they can improve. I want to show you what this video component of MET looks like in action.

(Video) My name is Sarah Brown Wessling. I am a high school English teacher at Johnston High School in Johnston, Iowa. I think that there is a difference for teachers between the abstract of how we see our practice and then the concrete reality of it.

So it helps to ask concrete questions during classes, and it is incredibly useful to tape these classes to learn further not just in them but also from them.

I think what video offers for us is a certain degree of reality. You can't really dispute what you see on the video, and there is a lot to be learned from that, and there are a lot of ways that we can grow as a profession when we actually get to see this. I just have a flip camera and a little tripod and invested in this tiny little wide-angle lens. At the beginning of class, I just perch it in the back of the classroom. It's not a perfect shot. It doesn't catch every little thing that's going on. But I can hear the sound. I can see a lot. And I'm able to learn a lot from it. So it really has been a simple but powerful tool in my own reflection.

Once I'm finished taping, then I put it in my computer, and then I'll scan it and take a peek at it. If I don't write things down, I don't remember them.

So having the notes is a part of my thinking process, and I discover what I'm seeing as I'm writing. I really have used it for my own personal growth and my own personal reflection on teaching strategy and methodology and classroom management, and just all of those different facets of the classroom.

I think that video exposes so much of what's intrinsic to us as teachers in ways that help us learn and help us understand, and then help our broader communities understand what this complex work is really all about. I think it is a way to exemplify and illustrate things that we cannot convey in a lesson plan, things you cannot convey in a standard, things that you cannot even sometimes convey in a book of pedagogy.

Every classroom could look something like that. But we still have more work to do. Diagnosing areas where a teacher needs to improve is only half the battle. We also have to give them the tools they need to act on the diagnosis. If you learn that you need to improve the way you teach fractions, you should be able to watch a video of the best person in the world teaching fractions.

So building this complete teacher feedback and improvement system won't be easy. For example, I know some teachers aren't immediately comfortable with the idea of a camera in the classroom. That's understandable, but our experience with MET suggests that if teachers manage the process, if they collect video in their own classrooms, and they pick the lessons they want to submit, a lot of them will be eager to participate.

Building this system will also require a considerable investment. Our foundation estimates that it could cost up to five billion dollars. Now that's a big number, but to put it in perspective, it's less than two percent of what we spend every year on teacher salaries.

The impact for teachers would be phenomenal. We would finally have a way to give them feedback, as well as the means to act on it.

But this system would have an even more important benefit for our country. It would put us on a path to making sure all our students get a great education, find a career that's fulfilling and rewarding, and have a chance to live out their dreams. This wouldn't just make us a more successful country. It would also make us a more fair and just one, too.

I'm excited about the opportunity to give all our teachers the support they want and deserve. I hope you are too.

A passionate techie and a shrewd businessman, Bill Gates changed the world while leading Microsoft to dizzying success. Now he's doing it again with his own style of philanthropy and passion for innovation

Transcript of a TED Talk delivered in May 2013. It may be viewed through the link: https://www.ted.com/talks/bill_gates_teachers_need_real_feedback

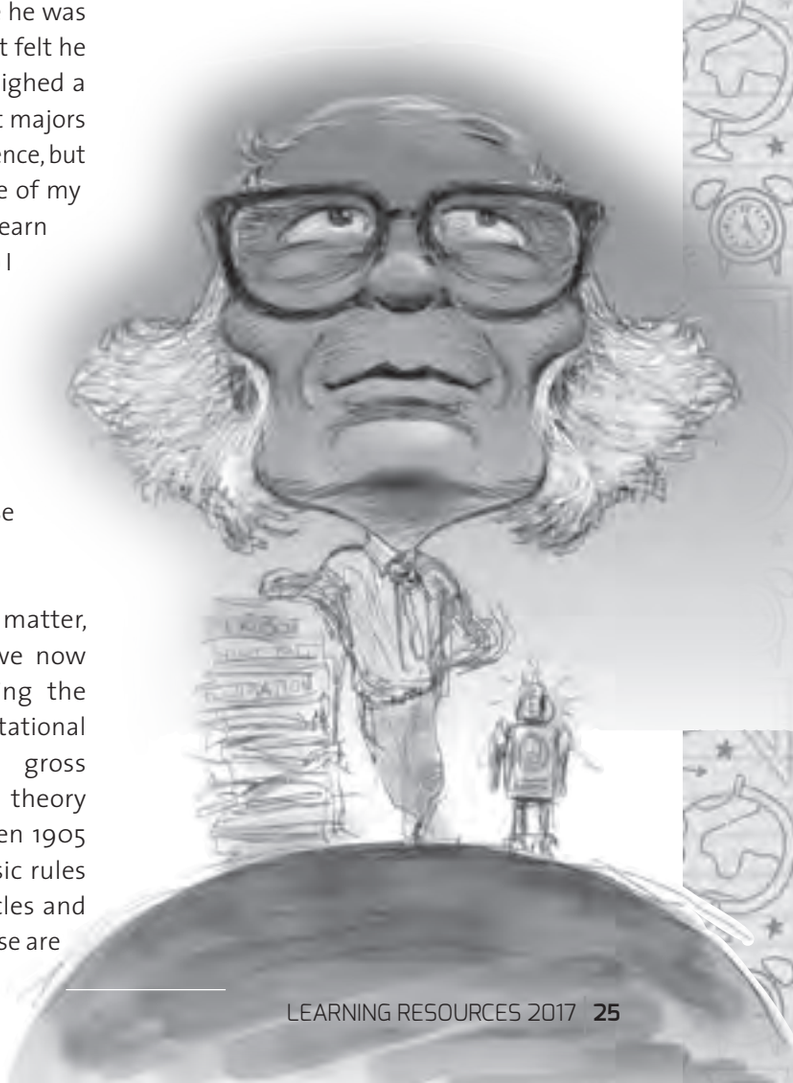
The Relativity of Wrong

Isaac Asimov

I received a letter the other day. It was handwritten in crabbed penmanship so that it was very difficult to read. Nevertheless, I tried to make it out just in case it might prove to be important. In the first sentence, the writer told me he was majoring in English literature, but felt he needed to teach me science. (I sighed a bit, for I knew very few English Lit majors who are equipped to teach me science, but I am very aware of the vast state of my ignorance and I am prepared to learn as much as I can from anyone, so I read on.)

It seemed that in one of my innumerable essays, I had expressed a certain gladness at living in a century in which we finally got the basis of the universe straight.

I didn't go into detail in the matter, but what I meant was that we now know the basic rules governing the universe, together with the gravitational interrelationships of its gross components, as shown in the theory of relativity worked out between 1905 and 1916. We also know the basic rules governing the subatomic particles and their interrelationships, since these are very neatly described by the quantum theory worked out between 1900 and 1930. What's more, we have found that the galaxies and clusters of galaxies are



the basic units of the physical universe, as discovered between 1920 and 1930.

These are all twentieth-century discoveries, you see.

The young specialist in English Lit, having quoted me, went on to lecture me severely on the fact that in every century people have thought they understood the universe at last, and in every century they were proved to be wrong. It follows that the one thing we can say about our modern "knowledge" is that it is wrong. The young man then quoted with approval what Socrates had said on learning that the Delphic oracle had proclaimed him the wisest man in Greece. "If I am the wisest man," said Socrates, "it is because I alone know that I know nothing." the implication was that I was very foolish because I was under the impression I knew a great deal.

My answer to him was, "John, when people thought the earth was flat, they were wrong. When people thought the earth was spherical, they were wrong. But if you think that thinking the earth is spherical is just as wrong as thinking the earth is flat, then your view is wronger than both of them put together."

The basic trouble, you see, is that people think that "right" and "wrong" are absolute; that everything that isn't perfectly and completely right is totally and equally wrong.

However, I don't think that's so. It seems to me that right and wrong are fuzzy concepts, and I will devote this essay to an explanation of why I think so.

When my friend the English literature expert tells me that in every century scientists think they have worked out the universe and are always wrong, what I want to know is how wrong are they? Are they always wrong to the same degree? Let's take an example.

In the early days of civilization, the general feeling was that the earth was flat. This was not because people were stupid, or because they were intent on believing silly things. They felt it was flat on the basis of sound evidence. It was not just a matter of "That's how it looks," because the earth does not look flat. It looks chaotically bumpy, with hills, valleys, ravines, cliffs, and so on.

Of course there are plains where, over limited areas, the earth's surface does look fairly flat. One of those plains is in the Tigris-Euphrates area, where the first historical civilization (one with writing) developed, that of the Sumerians. Perhaps it was the appearance of the plain that persuaded the clever Sumerians to accept the generalization that the earth was flat; that if you somehow evened out all the elevations and depressions, you would be left with flatness. Contributing to the notion may have been the fact that stretches of water (ponds and lakes) looked pretty flat on quiet days.

Another way of looking at it is to ask what is the "curvature" of the earth's surface over a considerable length, how much does the surface deviate (on the average) from perfect flatness. The flat-earth theory would make it seem that the surface doesn't deviate from flatness at all, that its curvature is 0 to the mile.

Nowadays, of course, we are taught that the flat-earth theory is wrong; that it is all wrong, terribly wrong, absolutely. But it isn't. The curvature of the earth is nearly 0 per mile, so that although the flat-earth theory is wrong, it happens to be nearly right. That's why the theory lasted so long.

There were reasons, to be sure, to find the flat-earth theory unsatisfactory and, about 350 B.C., the Greek philosopher Aristotle summarized them. First, certain stars disappeared beyond the Southern Hemisphere as one traveled north, and beyond the Northern Hemisphere as one traveled south. Second, the earth's shadow on the moon during a lunar eclipse was always the arc of a circle. Third, here on the earth itself, ships disappeared beyond the horizon hull-first in whatever direction they were traveling.

All three observations could not be reasonably explained if the earth's surface were flat, but could be explained by assuming the earth to be a sphere.

What's more, Aristotle believed that all solid matter tended to move toward a common center, and if solid matter did this, it would end up as a sphere. A given volume of matter is, on the average, closer to a common center if it is a sphere than if it is any other shape whatever.

About a century after Aristotle, the Greek philosopher Eratosthenes noted that the sun cast a shadow of different lengths at different latitudes (all the shadows would be the same length if the earth's surface were flat). From the difference in shadow length, he calculated the size of the earthly sphere and it turned out to be 25,000 miles in circumference.

The curvature of such a sphere is about 0.000126 per mile, a quantity very close to 0 per mile, as you can see, and one not easily measured by the techniques at the disposal of the ancients. The tiny difference between 0 and 0.000126 accounts for the fact that it took so long to pass from the flat earth to the spherical earth.

Mind you, even a tiny difference, such as that between 0 and 0.000126, can be extremely important. That difference mounts up. The earth cannot be mapped over large areas with any accuracy at all if the difference isn't taken into account and if the earth isn't considered a sphere rather than a flat surface. Long ocean voyages can't be undertaken with any reasonable way of locating one's own position in the ocean unless the earth is considered spherical rather than flat.

Furthermore, the flat earth presupposes the possibility of an infinite earth, or of the existence of an "end" to the surface. The spherical earth, however, postulates an earth that is both endless and yet

finite, and it is the latter postulate that is consistent with all later findings.

So, although the flat-earth theory is only slightly wrong and is a credit to its inventors, all things considered, it is wrong enough to be discarded in favor of the spherical-earth theory.

And yet is the earth a sphere?

No, it is not a sphere; not in the strict mathematical sense. A sphere has certain mathematical properties - for instance, all diameters (that is, all straight lines that pass from one point on its surface, through the center, to another point on its surface) have the same length.

That, however, is not true of the earth. Various diameters of the earth differ in length.

What gave people the notion the earth wasn't a true sphere? To begin with, the sun and the moon have outlines that are perfect circles within the limits of measurement in the early days of the telescope. This is consistent with the supposition that the sun and the moon are perfectly spherical in shape.

However, when Jupiter and Saturn were observed by the first telescopic observers, it became quickly apparent that the outlines of those planets were not circles, but distinct ellipses. That meant that Jupiter and Saturn were not true spheres.

Isaac Newton, toward the end of the seventeenth century, showed that a massive body would form a sphere under the pull of gravitational forces (exactly as Aristotle had argued), but only if it were not rotating. If it were rotating, a centrifugal effect would be set up that would lift the body's substance against gravity, and this effect would be greater the closer to the equator you progressed. The effect would also be greater the more rapidly a spherical object rotated, and Jupiter and Saturn rotated very rapidly indeed.

The earth rotated much more slowly than Jupiter or Saturn so the effect should be smaller, but it should still be there. Actual measurements of the curvature of the earth were carried out in the eighteenth century and Newton was proved correct.

The earth has an equatorial bulge, in other words. It is flattened at the poles. It is an "oblate spheroid" rather than a sphere. This means that the various diameters of the earth differ in length. The longest diameters are any of those that stretch from one point on the equator to an opposite point on the equator. This "equatorial diameter" is 12,755 kilometers (7,927 miles). The shortest diameter is from the North Pole to the South Pole and this "polar diameter" is 12,711 kilometers (7,900 miles).

The difference between the longest and shortest diameters is 44 kilometers (27 miles), and that means that the "oblateness" of the earth (its departure from true sphericity) is 44/12755, or 0.0034. This amounts to l/3 of 1 percent.

To put it another way, on a flat surface, curvature is 0 per mile everywhere. On the earth's spherical surface, curvature is 0.000126 per mile everywhere (or 8 inches per mile). On the earth's oblate spheroidal surface, the curvature varies from 7.973 inches to the mile to 8.027 inches to the mile.

The correction in going from spherical to oblate spheroidal is much smaller than going from flat to spherical. Therefore, although the notion of the earth as a sphere is wrong, strictly speaking, it is not as wrong as the notion of the earth as flat.

Even the oblate-spheroidal notion of the earth is wrong, strictly speaking. In 1958, when the satellite Vanguard I was put into orbit about the earth, it was able to measure the local gravitational pull of the earth--and therefore its shape--with unprecedented precision. It turned out that the equatorial bulge south of the equator was slightly bulgier than the bulge north of the equator, and that the South Pole sea level was slightly nearer the center of the earth than the North Pole sea level was.

There seemed no other way of describing this than by saying the earth was pear-shaped, and at once many people decided that the earth was nothing like a sphere but was shaped like a Bartlett pear dangling in space. Actually, the pear-like deviation from oblate-spheroid perfect was a matter of yards rather than miles, and the adjustment of curvature was in the millionths of an inch per mile.

In short, my English Lit friend, living in a mental world of absolute rights and wrongs, may be imagining that because all theories are wrong, the earth may be thought spherical now, but cubical next century, and a hollow icosahedron the next, and a doughnut shape the one after.

What actually happens is that once scientists get hold of a good concept they gradually refine and extend it with greater and greater subtlety as their instruments of measurement improve. Theories are not so much wrong as incomplete.

This can be pointed out in many cases other than just the shape of the earth. Even when a new theory seems to represent a revolution, it usually arises out of small refinements. If something more than a small refinement were needed, then the old theory would never have endured.

Copernicus switched from an earth-centered planetary system to a sun-centered one. In doing so, he switched from something that was obvious to something that was apparently ridiculous. However, it was a matter of finding better ways of calculating the motion of the planets in the sky, and eventually the geocentric theory was just left behind. It was precisely because the old theory gave results that were fairly good by the measurement standards of the time that kept it in being so long.

Again, it is because the geological formations of the earth change so slowly and the living things upon it evolve so slowly that it seemed reasonable at first to suppose that there was no change and that the earth and life always existed as they do today. If that were so, it would make no difference whether the earth and life were billions of years old or thousands. Thousands were easier to grasp.

But when careful observation showed that the earth and life were changing at a rate that was very tiny but not zero, then it became clear that the earth and life had to be very old. Modern geology came into being, and so did the notion of biological evolution.

If the rate of change were more rapid, geology and evolution would have reached their modern state in ancient times. It is only because the difference between the rate of change in a static universe and the rate of change in an evolutionary one is that between zero and very nearly zero that the creationists can continue propagating their folly.

Since the refinements in theory grow smaller and smaller, even quite ancient theories must have been sufficiently right to allow advances to be made; advances that were not wiped out by subsequent refinements.

The Greeks introduced the notion of latitude and longitude, for instance, and made reasonable maps of the Mediterranean basin even without taking sphericity into account, and we still use latitude and longitude today.

The Sumerians were probably the first to establish the principle that planetary movements in the sky exhibit regularity and can be predicted, and they proceeded to work out ways of doing so even though they assumed the earth to be the center of the universe. Their measurements have been enormously refined but the principle remains.

Naturally, the theories we now have might be considered wrong in the simplistic sense of my English Lit correspondent, but in a much truer and subtler sense, they need only be considered incomplete.

Isaac Asimov (1920-92) was an American writer and professor of biochemistry at Boston University. He was known for his works of science fiction and popular science.

Published in the periodical The Skeptical Inquirer, Fall 1989, Vol. 14, No. 1, Pp. 35-44

स्कूल के सवाल ज़िंदगी के सवालों से फर्क क्यों?

प्रोफेसर यशपाल

जिस विषय पर मैं बोलने वाला हूँ वो है 'हमारी शिक्षा, हमारा विज्ञान – आगे अब क्या करें?'

एक सवाल से शुरू करते हैं – यहां तो स्कूल के बहुत सारे बच्चे भी आए हुए हैं। अच्छा, एक बात बताओ कि जब अपनी आवाज़ को पहली बार टेपरिकॉर्डर में भरा और उसे सुना तो क्या वो आवाज़ अपनी लगी? नहीं न! क्यों? लेकिन जब इसी टेपरिकॉर्ड हुई आवाज़ को किसी दोस्त को सुनाया तो उसको लगा कि यह तो आप ही की आवाज़ थी। ऐसा क्यों?

कौन–सा सवाल स्कूल का और कौन–सा नहीं

कभी इस प्रश्न के बारे में किसी शिक्षक से पूछा कि ऐसा क्यों होता है?

मैं शिक्षकों से भी पूछना चाहता हूँ कि क्या आपके मन में यह सवाल कभी उठा था? कभी आपने इस प्रश्न को स्कूल में उठाया है? मुझे मालूम है कि जवाब 'न' में है क्योंकि मैंने शिक्षकों से पहले से पूछ रखा है।

इस घटना से सवाल पैदा होता है हमारी शिक्षा के बारे में – कि अपनी आवाज़ वाला प्रश्न बहुत से बच्चें ने अनुभव किया है – लेकिन ऐसा कैसे हुआ कि उनको शुरू से ही पता चल गया कि यह स्कूल में उठाया जाने वाला प्रश्न नहीं है। और शिक्षक को भी पता चल जाता है कि यह स्कूल का प्रश्न नहीं है।

यह चीज़ मुझे बहुत तंग करती है कि – ऐसा क्यों हुआ और इसको कैसे बदला जा सकता है। काफी गहराई तक यह बात हमारी शिक्षा और विज्ञान में फैली हुई है। इसी कारण से यह भी हुआ है कि अंधविश्वासों से जुड़े बहुत सारे प्रश्न भी उन सवालों में शामिल कर लिए जाते हैं जो स्कूल के प्रश्न नहीं हैं, जिनके उत्तर जानने की आवश्यकता नहीं है।

खैर टेपरिकॉर्डर वाले सवाल पर फिर से चलते हैं। ज़रा कान बंद करके अपना नाम बोलो, ज़ोर से?

सुनी अपनी आवाज़, कैसी लगी? थोड़ी अजब लगी न। तो कान बंद करके भी आवाज़ सुनाई देती है लेकिन थोड़ी अजब लगती है।

कहां से आती हैं ये आवाज? हमारे अंदर होने वाले कंपन से आवाज़ पैदा होती है – वो हड्डियों से, रेशों से, मांसपेशियों से निकलकर उस जगह पहुंचती है जहां आवाज़ को महसूस करने वाला 'आला' अंदर है। जब हम बोलते हैं तो इस आवाज़ को अंदर से भी सुनते हैं और मुंह से बाहर निकलने के बाद हवा से होकर जो कानों तक पहुंचती है उस आवाज़ को भी सुनते हैं – यानी हम अपनी जिस आवाज़ को सुनते हैं वह इन अंदर बाहर वाली आवाज़ों का मिश्रण होती है। लेकिन बेचारा टेपरिकॉर्डर तो केवल वही सुनता है जो बाहर से आती है। दूसरे लोग भी बाहर वाल आवाज़ को ही सुनते हैं। इसीलिए दूसरे लोगों को लगता है कि टेपरिकॉर्डर सच कह रहा है और आपको लगता है कि नहीं, ठीक नहीं कह रहा है।

अब सवाल वही है कि ये प्रश्न स्कूल में क्यों नहीं पूछा गया? किससे पूछा जाए? अब यह भौतिकी के शिक्षक से पूछा जाए या शरीर विज्ञान के शिक्षक से पूछा जाए। जो भौतिकी पढ़ाता है वह शरीर विज्ञान नहीं जानता और जो शरीर विज्ञान पढ़ाता है वह भौतिकी नहीं जानता; और दोनों लोग आपस में कभी बात नहीं करते। परन्तु ज़िंदगी के जितने प्रश्न है, ज़िंदगी में जिन–जिन चीज़ों का ताल्लुक है वह किसी एक विषय या क्षेत्र में तो मिलते नहीं। अक्सर इनमें बहुत सारे विषयों की आवश्यकता होती है।

तो हमने अपनी समझ को अपनी पढ़ाई को विषयों के दायरे में इस प्रकार से बांध कर रख दिया है कि स्कूल के लिए ऐसा कोई भी प्रश्न जिसमें एक से अधिक डिसिप्लिन की ज़रूरत पड़ती है – वैध प्रश्न नहीं है, वह इम्तहान में नहीं आएगा। उस पर काम करने की, सोचने की, कोई आवश्यकता नहीं है। और इसी वजह से जब हम समाज में जाते हैं, जब समस्याएं सामने आती हैं – हम कुछ नहीं कर पाते। क्योंकि समस्याओं को तो हर विषय की ज़रूरत होती है और हम कहते हैं – हमारा विषय नहीं, हमारा विषय नहीं, हमारा विषय नहीं... इसीलिए हम कुछ भी कर नहीं पाते।

जितने विषय उतरी दीवारें

मैं बहुत बार सोचता हूं कि हमारे देश में सी. टी. स्कैन की मशीन ईजाद क्यों नहीं हो सकी? आमतौर पर लोग कहते हैं कि अरे यार भारत की क्या क्षमता है जो सी.टी. स्कैन ईजाद कर सके, यह तो बड़े–बड़े देशों में होता है। चलिए ज़रा देखते हैं कि सी.टी. स्कैन में क्या है? आपको एक्स–किरणों के बारे में मालूम होना चाहिए, आपके पास एक्स–किरणें पैदा करने और उन्हें पहचान सकने वाले उपकरण होने चाहिए, इलेक्ट्रॉनिक्स आना चाहिए, मैकेनिकल इंजीनियरिंग अच्छी होनी चाहिए ताकि चीज़ें घुमा कर देख सकें। लेकिन साथ–ही–साथ सबसे ज़रूरी है कि इलेक्ट्रॉनिक्स जानने वाले, भौतिकी जानने वाले और एक्स–किरणों पर काम करने वालों आदि के बीच संवाद होना चाहिए। उन्होंने आपस में कभी साथ बैठकर चाय तो पी हो; और हमारी पढ़ाई में यह नहीं होता। शरीर विज्ञानी को यह पता नहीं होता कि उसके ज्ञान का क्या उपयोग हो सकता है और इसी तरह दूसरे विषय को जानने वाले को यह नहीं मालूम कि वो जो प्रयोगशाला में कर रहा है उसका उसके विषय के बाहर भी कोई इस्तेमाल हो सकता है? उनको मालूम ही नहीं कि साथ बैठकर काम करना कितना फायदेमंद हो सकता है। बल्कि ऐसा लगता है मानों साथ मिल कर काम करने की हमारे यहां मनाही है। हमने संस्थान ही अलग–अलग बना दिए हैं जहां पर विशेषज्ञता अलग–अलग रहती है।

जब भी हमें किसी चीज़ की ज़रूरत पड़ी है या फिर लगा है कि हम फलां चीज़ में पिछड़े हुए हैं और कुछ खास कर लें – हमने विशेष संस्थान खड़े कर दिए। हरेक चीज़ को अलग–अलग कर दिया। और इससे हुआ यह कि अलग–अलग क्षेत्रों में जो बढ़िया चीज़े हैं वे कभी एक जगह नहीं रहतीं। और अगर हों भी तो हमारे विभागों के बीच संवादहीनता ऐसी है कि लगता है कि बीच में लोहे की दीवारें खड़ी हों। वे आपस में बात ही नहीं करते।

कहते हैं कि मै भौतिक का विशेषज्ञ हूं, मैं रसायन का विशेषज्ञ हूं या मैं फलां चीज़ का विशेषज्ञ हूं .... जब तक इकट्ठे नहीं होंगे तो ज़िंदगी नहीं चलेगी। और सामाजिक विज्ञान को भी साथ में लेना चाहिए ताकि यह मालूम पड़े कि क्या बनाना है, किसके लिए बनाना है। लेकिन इनको भी शामिल नहीं होने देते।

हमारे देश में तो यह बहुत हुआ है कि किसी को डर लगा कि भई संस्कृत की पढ़ाई अच्छी नहीं हो रही, संस्कृत को बढ़ावा देना चाहिए। मैं भी मानता हूं संस्कृत को बढ़ावा देना चाहिए। परंतु संस्कृत को बढ़ावा देने के लिए करते यह

हैं कि संस्कृत यूनिवर्सिटी खोल दो। एक संस्कृत यूनिवर्सिटी, दो संस्कृत यूनिवर्सिटी, तीन, चार, पांच... और खोलने से होता यह है कि जो कुछ अच्छी संस्कृत जानने वाले हैं उन्हें यूनिवर्सिटी में रख देते हैं। वो भी इस कदर कि बाहर की कोई भी बात उन्हें प्रभावित न कर पाए। विश्वविद्यालय को तो ज्ञान का विश्व होना चाहिए। लेकिन ऐसा नहीं होता।

कैसे बना हमारा यह सोचने का ढंग कि लोगों को एक दूसरे से इतना कट के पढ़ना–सीखना चाहिए। क्या ज्ञान केवल अपने लिए है, कुछ काम करने के लिए नहीं?

क्या विज्ञान और क्या नहीं

टेलीविज़न प्रोग्राम टर्निंग पॉइंट के लिए बच्चों के बहुत सारे प्रश्न आया करते थे। मैंने महसूस किया कि शुक्र है कि कम–से–कम हमारे बच्चों का दिमाग अलग–अलग डिसिप्लन में बंटा नहीं होता। वे दुनिया को देखते हैं, समझने की कोशिश करते हैं और सवाल खड़े करते हैं। महत्वपूर्ण सवाल खोजते हैं।

मैंने एक यूनिवर्सिटी वालों से कहा कि थोड़ी मदद कीजिए, अपने कुछ विद्यार्थियों को इन सवालों को छांटने और जवाब ढूंढने के लिए लगाइए। उन लोगों ने कई सवालों के बारे में तो कह दिया कि ये विज्ञान के प्रश्न ही नहीं है।

चलिए एक छोटा–सा प्रश्न बताता हूं, एक बच्चे का, वह कहता है –

"एक दिन मैं खड़ा था पेड़ों के बीच, दूसरी तरफ से चंद्रमा दिख रहा था। उसे देखकर मैंने भागना शुरू किया तो मैंने देखा कि चंद्रमा मेरे साथ भाग रहा है, पेड़ों के पीछे–पीछे। मैं रूक गया, चंद्रमा भी खड़ा हो गया – ऐसा क्यों होता है?"

यह तय है कि आप यह प्रश्न किसी शिक्षक को देंगे तो वह कहेगा इसमें विज्ञान कहां है? यह तो विज्ञान का प्रश्न ही नहीं है, इसलिए जवाब देने की कोई आवश्यकता नहीं है, समझने की आवश्यकता नहीं है, यह तो मात्र अनुभूति है।

लेकिन यह बहुत ही सुंदर सवाल है, क्योंकि इसमें जो अनुभूति है उसमें पूर्णता है, और इसमें सुंदरता भी है। बच्चे ने इसे देखा है, वो चांद के साथ खेला है। चांद के साथ खेलना तो बड़ी उम्दा चीज़ है न, विज्ञान से क्यों निकालते हो उसको?

तो क्या कहोगे बच्चों से इस सवाल के जवाब में कि नहीं बेटा ऐसा नहीं होता, बस खतम, यही जवाब है?

मुझे याद आता है जब मैं छोटा था गाड़ी में सफर किया करते थे। बचपन मेरा क्वेटा (ब्लूचिस्तान) में गुज़रा है। तो जब चलती गाड़ी की खिड़की से देखते थे तो ऐसा लगता था कि साथ वाले पेड़ और चट्टान तो बड़े ज़ोर से पीछे जा रहे हैं और बहुत दूर वाले ऐसे लगते थे कि खड़े हों, पीछे हटते ही नहीं। खिड़की से देखो तो लगता था कि मानों ज़मीन घूम रही है।

क्यों है ऐसा? यह सवाल दिशा भेद (Parallex) का है, दूरी को कैसे नापते हैं, क्या चीज़ है पेरेलेक्स?

थोड़ा बच्चे को घुमाइए, गाड़ी से लेकर जाइए, साइकिल पर घुमाइए, उसको अनुभव इकट्ठा करने दीजिए। बच्चा खुद–ब–खुद उसका मतलब निकाल लेगा। लेकिन उसे छोड़िए मत। यह प्रश्न ज़रूरी है।

एक और प्रश्न में मुझे बड़ा मज़ा आया, जिसका जवाब शायद हमें पूरी तौर पर मालूम नहीं है – अगर कोई मुझे गुदगुदी करता है तो हंसी आती है लेकिन जब मैं खुद को करता हूं तो हंसी नहीं आती, ऐसा क्यों होता है? यह एक बहुत ही बढ़िया

सवाल है और पूछने वाले की उम्र और वह कितना जानता है के हिसाब से इस सवाल को लेकर इतनी सारी खिड़कियां खोली जा सकती हैं, और खूब दूर तलक जाया जा सकता है; और इसके बाद यही कहा जा सकता है कि इसके आगे अभी पता नहीं है कि क्या होता है?

जैसे कि थोड़े बड़े बच्चों के ध्यान में यह बात लाई जा सकती है कि जब भी कोई संवेदन होता है – जैसे कि कहीं दर्द या कुछ चुभ गया आदि – तो दरअसल यह संवेदन दिमाग में होता है। उस जगह से दिमाग तक एक संदेश पहुंचता है कि भई यहां कुछ गड़बड़ी है, कुछ करो।

अगर बच्चा थोड़ा अधिक बड़ा है तो उसे संदेश एक जगह से दूसरी जगह जाने के बारे में और बताया जा सकता है – यह संदेश जाना बड़ी बुनियादी चीज़ है। कहते हैं न कि दर्द हो रहा है गोली खा लो। यह गोली चोट लगने वाली जगह पर तो कुछ नहीं करती बल्कि दिमाग में संवदेन को कम करती है।

अगर और बड़ा है बच्चा तो उसे यह भी कहा जा सकता है कि यह जो दर्द, जिसे प्रकृति ने ईजाद किया है, बड़े कमाल की चीज़ है। अगर दर्द का यह संवेदन न होता तो कोई आपकी उंगली काट ले और आपको पता ही न चले। और दुनिया के कुछेक चंद लोगों को यह बीमारी है – वे दर्द महसूस नहीं करते। वे अपनी उंगली चबा जाते हैं और उन्हें पता ही नहीं चलता। तो दर्द जो है, वह दरअसल शरीर पर नियंत्रण रखने वाले तंत्र का एक महत्वपूर्ण हिस्सा है।

इसका गुदगुदी से क्या ताल्लुक है? दर्द की तो बड़ी लंबी कहानी है। इस कहानी का एक हिस्सा बताना पड़ेगा कि उंगली काट लो तो दर्द होता है, लेकिन हाथ कट जाए तो यह नहीं कि लाख गुना ज़्यादा दर्द होगा। अंदर जो संवेदन वाला है वह कहता है कि हो गया भई, काफी दर्द हो गया, पता चल गया है; वहां भी नियंत्रण है। और दर्द को धीमा करने के लिए दिमाग खुद ओपियस उत्पादित करता है, जो अफीम जैसी चीज़ है। ताकि दर्द का संवेदन कम हो जाए।

दिमाग वापस संकेत भेजता है चोट लगने वाले हिस्से के आस–पास के क्षेत्रों को कि वे अपनी दर्द को महसूस करने की सीमा बढ़ा दें – यह जानने के लिए कि कितने हिस्से में तकलीफ हुई है। यह सब चलता रहता है।

तो यह जो गुदगुदी की बात है कि किसी ने आपको गुदगुदी कर दी, यह घटना अचानक हुई तो संवेदन हुआ कि कुछ गड़बड़ी हुई है। लेकिन संवेदना इतनी कम थी कि मैं बच्चों को कहूंगा कि दिमाग भी हंसता है कि क्या यार, ऐसा संदेश भेज दिया! हो सकता है कि यह बात को रखने का वैज्ञानिक ढंग नहीं है। लेकिन मज़ेदार बात यह जानना है कि इस संवेदन को दिमाग द्वारा इस तरह से नहीं देखा गया कि कोई गंभीर कार्यवाही करने की ज़रूरत लगे।

तो आप कहते हैं कि मैं खुद को गुदगुदी करूं तब हसी क्यों नहीं आती? अब देखिए 'मैंने गुदगुदी कर ली' का अर्थ क्या है? मैंने दिमाग में पहले ही सोच लिया कि किस समय पर, किस जगह पर गुदगुदी करनी है और उसी के हिसाब से नियंत्रित होकर मेरा हाथ उठा; जाकर बिल्कुल उसी स्थान पर लगा। अब वहां से जो संदेश जाएगा, दिमाग ने तो पहले से ही उसके लिए अपनी दुकान बंद कर रखी है। क्योंकि उसे मालूम है कि यहां से कुछ ऐसा आएगा जिसकी फिकर करने की कोई ज़रूरत नहीं है। तो आप संदेश लाने, ले जाने की प्रक्रिया पर आगे बात कर सकते हैं। यानी इस सवाल को लेकर इतनी खिड़कियां खोली जा सकती हैं, इतनी दूर तक जाया जा सकता है। तो फिर ऐसे सवालों को दरकिनार क्यों करना चाहिए।

रटना, समझना और इम्तहान

चलिए पीछे की ओर, थोड़ा वापस चलते हैं – आज़ादी की 50वीं वर्षगांठ है। उस समय के मुकाबले हमारे पास कहीं ज़्यादा स्कूल हैं। लेकिन अभी भी हालत यह है कि देश के लगभग आधे युवा कभी भी स्कूल नहीं गए हैं। हम विकास की बात करते हैं लेकिन यह भूल जाते हैं कि दुनिया में कोई भी ऐसा मुल्क नहीं है जो विकसित हो लेकिन जिसके सब लोग पढ़े–लिखे नहीं हों या फिर कोई ऐसा देश हो जिसके सारे लोग पढ़े लिखे हों लेकिन मुल्क विकसित नहीं हुआ हो।

कभी–कभी मुझे लगता है कि जो बच्चे स्कूल छोड़ देते हैं वो ज़्यादा होशियार होते हैं। गांव के बच्चे, इधर–उधर के बच्चे। उनके मां–बाप उनको ठोक–पीट कर या तो भेज नहीं पाते या फिर भेजते नहीं हैं। बच्चे स्कूल छोड़ इसलिए देते हैं कि वे देखते हैं कि उनके आसपास की जो ज़िंदगी है उसका स्कूल की पढ़ाई में कोई ज़िक्र नहीं है, कोई ताल्लुक नहीं है। स्कूल की पढ़ाई में यह है कि अधिक–से–अधिक चीज़े डालते जाइए, याद कर लीजिए, रट लीजिए इम्तहान पास करिए, परंतु ज़िंदगी से कोई सरोकार नहीं होना चाहिए। और वे बच्चे कहते हैं कि हमें याद करना, बिना समझे रटना नहीं है और स्कूल छोड़ देते हैं। हमें मालूम है कि हमारे जो लोग अनपढ़ हैं वे और चीज़ों में बहुत होशियार है। अगर ऐसे लोग पढ़ पाते तो बहुत ऊपर तक जा सकते थे, लेकिन हमने यह नहीं होने दिया।

कभी आपने सोचा कि याद करने और रटने पर जो ज़ोर है हमारी पढ़ाई में इसमें भी एक बात छुपी हुई है – कि पढ़ाई याद रखना है, पढ़ाई समझना नहीं है। यहां तक कि बहुत से लोग तो समझना क्या होता है भूल ही गए हैं। इसका मुझे काफी खतरा लगता है कि हो सकता है कि हमारे बहुत सारे पढ़ाने वालों में इस प्रकार के लोग आ गए हैं जिन्होंने ठीक प्रकार से सीखा ही नहीं कि समझना क्या होता है।

मनोविज्ञान और न्यूरो बायोलॉजी से पता चला है कि बचपन में जब हम पढ़ते हैं, सीखते हैं, बड़े होते हैं उस समय एक ऐसा खास दौर आता है जब अगर हमने अपनी क्षमता का इस्तेमाल नहीं किया तो दिमाग उस सर्किट को बंद कर देता है – हमेशा के लिए। अंदर का जो मैनेजर है वो कहता है कि इस पैकेज को हमने डाला था लेकिन यह तो इस्तेमाल ही नहीं होता। इसे बंद कर दो। उसके बाद यह बहुत मुश्किल से खुलता है। (जैसे कि कम्प्यूटर वाले जानते हैं कि अगर कोई प्रोग्राम पड़ा है जिसका कोई काम नहीं है तो आप उसे निकाल देते हैं)।

मुझे कभी–कभी लगता है कि क्या ऐसा संभव है कि पढ़ाने वाले जो बहुत सारे लोग आ गए हैं उनकी यह क्षमता बची ही न हो। ऐसे में वे किस प्रकार बच्चों को यह क्षमता दे पाएंगे। अगर ऐसा हुआ है तो यह बेहद खतरनाक बाता है। और इसे जो चीज़ और खराब करती है वो है रटना। सभी इस तरफ जा रहे हैं। प्रतिस्पर्धा करते हैं तो वह भी रट के।

आजकल तो सिर्फ नंबर लाना ही पढ़ाने का मकसद हो गया है। शिक्षा के संस्थान सिर्फ परीक्षा लेने के केन्द्र बन गए हैं, न कि शिक्षा देने के। कितनी सूचनाएं हैं, क्रिकेट में क्या हुआ, किस साल क्या हुआ, कितने नाम याद हैं... आदि–आदि। यह सब क्या है, क्या इसलिए है यह दिमाग? इन छोटी–मोटी चीज़ों के लिए दिमाग को क्यों बरबाद किया जा रहा है। इंसान बना है विश्लेषण के लिए, समझने के लिए, नए संबंध बनाने के लिए!

आपको याद होगा कि कुछ दिनों पहले एक कमेटी गठित हुई थी – बस्ते के बोझ के बारे में। इसकी रिपोर्ट हमने हाल ही में जमा की

है। हमने पाया कि चीज़ों को न समझ पाने की दिक्कत, बस्ते के वास्तविक बोझ की तुलना में कहीं ज़्यादा बड़ी समस्या है। उस पर ध्यान देने की बहुत आवश्यकता है।

समाज और शिक्षा का सवाल

आप जब भी पढ़ाने जाएं तो यह देखिए कि स्कूल और समाज का आपसी रिश्ता बना रहे, स्कूल और पर्यावरण का रिश्ता बना रहे। तब समाज के प्रश्न स्कूल में आएंगे, उनका उत्तर मिलेगा। तब लोग सृजनात्मक होंगे, विद्यार्थियों में से कवि निकलेंगे, लेखक निकलेंगे। अगर पढ़ाई का ज़िंदगी के साथ ताल्लुक नहीं है, तो आप पढ़ तो लेंगे लेकिन आविष्कारक बनना कठिन है। आविष्कारक वे बनते हैं, जो उंगलियों से भी सीखते हैं और दिमाग़ से भी सीखते हैं। और जो दोनों को मिलाकर काम करते हैं वे बड़े वैज्ञानिक बनते हैं।

लेकिन हमारे समाज ने एक ऐसी खाई खड़ी कर दी कि जो हाथ से काम करेंगे वे पढ़ाई से वंचित रहेंगे और जो पढ़ेंग वे हाथ से काम नहीं करेंगे। या तो उन्हें इजाज़त नहीं है या फिर वे बुरा मान जाते हैं। चाहे यह जाति प्रथा से उपजा हो या फिर कहीं और से आया हो – लेकिन यह प्रचलन काफी बढ़ गया है। इसे और बढ़ाया गया मैकॉले की नीति से। अगर थोड़ा लिखना आ गया और थोड़ी अंग्रेज़ी आ गई तो ठीक है, वही तो चाहिए क्लर्क के लिए – किसी तरह की योग्यता नहीं। लेकिन कुछ लोग बच जाते हैं इस सिस्टम से। क्योंकि चाहे कितनी भी कोशिश करो सिस्टम सबको मार नहीं सकता। ऐसे लोग सिस्टम से निकलकर, उभरकर उड़ते हैं – और हमारा सौभाग्य है कि हमारे देश में ऐसे बहुत सारे लोग हैं, जो इस तरह से उड़े हैं, उड़ रहे हैं। उड़ते हैं और बच जाते हैं और उम्दा भी बन जाते हैं।

यह सब नई बातें हैं, ऐसा नहीं है। लेकिन शिक्षा की स्थिति तो गड़बड़ है। नई–नई शिक्षा नीतियां आती रहती हैं, चलती रहती हैं। मैंने देखा है कि शिक्षा को आप जितना ठीक करने की कोशिश करते हो वो उतना ही बिगड़ती जाती है। क्यों?

शायद जब ठीक करने लगते हैं तो समझते हैं कि इसलिए खराब है कि शिक्षक पढ़ाते नहीं, स्कूल नहीं आते, या फिर ऐसा या वैसा... और हम संसाधन बढ़ाने की कोशिश करते हैं। व्यवस्थाएं ठीक करने में लग जाते हैं।

और मैनेजर जो होते हैं उनकी ट्रेनिंग ही ऐसी होती है कि सारा का सारा सिस्टम एक–सा होना चाहिए। एक जैसे ही इम्तहान हो, एक जैसी ही पुस्तकें हों – लेकिन अगर मैं अतिवादी हो जाऊं तो मेरा मानना है कि पाठ्यक्रय हरेक मनुष्य के लिए अलग–अलग होने चाहिए।

लेकिन अगर इतना ही मान लें कि पाठ्यक्रम का कम–से–कम उसके वातावरण से कुछ जुड़ाव होना चाहिए तो कैसे हो सकता है केरल के तट पर भी और हिमालय के पहाड़ों पर भी एक जैसे सवाल उठें – अलग–अलग प्रश्न उठेंगे; और इन अलग–अलग सवालों से मिलकर जो सवाल बनेंगे तो आप उम्दा से उम्दा भौतिकी भी सीख लेंगे, जीवविज्ञान, रसायन आदि भी।

लेकिन आप केंद्रीकरण करेंगे, एक–सा बनाएंगे तो इम्तहान तो अच्छे हो जाएंगे, रौब डालेंगे कि देखो इतने कठिन पर्चे कर आते हैं हमारे बच्चे। परन्तु इन सबमें जान नहीं होगी, आत्मा नहीं होगी। उसमें विकेंद्रकरण की आवश्यकता है। लेकिन लोग कहेंगे कि नहीं इससे तो बर्बादी हो जाएगी, कुछ अच्छा नहीं होने वाला, सब खराब हो जाएगा। लेकिन मैं ज़ोर देता हूं कि खराब नहीं होगा और इसका उदाहरण भी है।

बहुत पहले से एक शिक्षण पद्धति हमारे देश में चली आ रही है, एक बड़ी भारी शिक्षण पद्धति। लेकिन हमारी नज़र उसकी ओर नहीं

जाती। किसान लोग कहां से सीखते हैं – अब यह मत कहिएगा कि किसानी करने में शिक्षा की क्या आवश्यकता है। बीज चुनना हो, पानी देना है, कब लगाना है, कब काटना है – बेचना है। हज़ारों चीज़ें इससे लगी हुई हैं, इसे स्कूल–कॉलेज का पढ़ा हुआ कोई बच्चा नहीं कर सकता। इसमें जो शिक्षा है वो मां–बाप से सीखता है, देखकर सीखता है, कर के सीखता है, रिस्क लेकर सीखता है; और ऐसे तो करोड़ों लोग हैं इस देश में जो हमको खाना खिलाते जा रहे हैं, और पैदावार लगातार बढ़ती जा रही है। देश उन पर बहुत गहरे तौर पर निर्भर है। स्कूल–कॉलेज से पढ़कर बहुत कम लोग किसानी करने आते है। इसमें से जिन किसानों के बच्चे स्कूल जाते हैं उनको इस तरह पढ़ाया जाता है कि गांव से टूट जाते हैं उनका इस काम से कोई ताल्लुक नहीं रहता। क्योंकि इस काम को छोटा–तुच्छ माना जाता है। जो चीज़ हम कर नहीं सकते, उसको तुच्छ मानते हैं।

आपकी मोटरसाइकिल, कार आदि खराब हो जाती है। उसको ठीक करने वाले मैकेनिक कहां से ज़मीन से निकलकर जगह–जगह पर आ जाते हैं? एक से मैंने पूछा, "कहां से मोटर बनाना सीखा?"

कहा, "उस्ताद से सीखा।" उस्ताद कहां से आते हैं? थोड़े वे आते होंगे इंजीनियरिंग कॉलेजों से, लेकिन बहुत से नहीं आते। इन उस्तादों की बच्चों को पढ़ाने की विधि क्या होती है? वो उन्हें प्यार करता है, पीटता–ठोकता है, समझाता है। इन उस्तादों से जब पूछा जाता है कि आप इन मैकेनिक्स को किस विधि से पढ़ाते है तो जवाब मिलेगा, "जी इन्हें सीखना पड़ता है।" लेकिन वे यह भी कहते हैं कि उन्हें हमारे कॉलेजों की पढ़ाई समझ नहीं आती। पूछो "क्यों?"

(कहते हैं) "क्योंकि आपके 80 फीसदी भी पास, 90 फीसदी भी पास, 40 फीसदी भी पास...। हमारा तो यह है कि बच्चा आता है सीखने–सीखता है, जब गाड़ी चल जाती है तो पास, नहीं चलती है तो कहते हैं कि बेटा, एक दो महीने और ठहरो, उसके बाद पास। कोई फेल नहीं होगा।"

और मै आपको बताऊं कि जो गाड़ियां भारत में ठीक हो जाती है वे विश्व के किसी भी कोने में ठीक नहीं हो सकती।

लोग उम्दा–उम्दा ज़ेवर पहनते है। हम लोग करोड़ों रूपए खर्च करके ज़ेवर बनवाते हैं। सुनार ज़ेवर बनाना सीख कर कहां से आता है?

तो जो मेहनत करने वाले लोग हैं – जो समझते हैं, करते हैं, उनकी कीमत नहीं है, उस पढ़ाई की कीमत नहीं है – उस सीख की कीमत नहीं है।

ये सारे लोग कहां से पढ़कर आ जाते हैं? ज़मीन से उगते हैं क्या ये लोग? आखिर हम क्यों नहीं पहचान पाते शिक्षा के इस तंत्र को। आप गिनते जाइए चीज़ों को जिन पर हमारी ज़िंदगी निर्भर रहती है, वे सब ऐसे लोगों से आती हैं।

दो सिस्टम का मेल क्यों नहीं

वो क्या वजह थी जिसके कारण जो नया सिस्टम हमने बनाया, उसमें इस सिस्टम को, इतना अलग–थलग कर दिया कि इस सिस्टम वाले की फॉर्मल सिस्टम में जगह नहीं है, उसके आने का कोई रास्ता ही नहीं है। एक आदिवासी का दस–बारह साल का बच्चा दो–सौ किस्म की वनस्पतियों के नाम और उनके उपयोग भी जानता है। लेकिन अगर आपकी बी.एस.सी. की परीक्षा में यह प्रश्न पूछ लें कि दो–सौ पौधों के नाम बताओ तो सब फेल हो जाएंगे। लेकिन आपके इस सिस्टम में उस आदिवासी बच्चे को तो स्कूल में एडमिशन भी नहीं मिलेगा। क्योंकि वो बा–बा–ब्लैकशीप नहीं बोल पाएगा।

दरअसल हमने अपने फॉर्मल सिस्टम में अंदर आने के तरीके ऐसे बना दिए कि या तो ऐसे लोग, जिनकी मैं बात कर रहा हूं, अंदर नहीं आ पाते। और आ भी पाएं तो उन्हें लगता है कि वे किसी काम के नहीं हैं। अरे भई, वे ही अधिक काम के हैं।

तो क्या बिल्कुल असंभव है इस प्रकार का सिस्टम बनाना कि ये जो लोग हाथ से काम करते हैं, ज़िंदगी को देखते हैं, नये किस्म की सुंदरता लाते हैं, जिनमें सृजनात्मकता है – ये लोग पढ़ें, क्वांटम मैकेनिक्स भी पढ़े, जीवविज्ञान भी पढ़ें और फिर देखिए कि किस प्रकार से ये देश उभरता है।

आखिर हमने इन दो पद्धतियों को अलग–अलग क्यों कर दिया है? जब भी शिक्षा को सुधारने के लिए कोई नई संस्था बनाते हैं तो नए प्रतिबंध आ जाते हैं और इस प्रकार के बचे–कुचे लोग और भी निकाल दिए जाते हैं। शिक्षा संस्थानों से मैं कहता हूं कि अधिक तो नहीं कर सकते कम–से–कम उनको इतनी इज़्जत तो दे सकते हो कि उनको बुलाओ, लोग उनसे सीखें, उनके साथ काम करें।

नवाचार गावों में

आप जा के देखिए गांवों में। कितनी नवाचार करते हैं ये लोग। लेकिन हम उनकी चीज़ों को उठाते नहीं। क्योंकि ऐसी किसी चीज़ को हमने विदेश में नहीं देखा है। और हमारे समाज में तो वो ही चीज़ें आएंगी जो विदेश से आई हों, और वहां से नहीं है तो असली नहीं, ठीक नहीं है। मानों भगवान ने कह रखा हो कि नई ईजाद तो बाहर के मुल्क में होनी चाहिए।

बहुत सारे नवाचार होते हैं जो पनपते नहीं हैं। क्योंकि उद्योग तंत्र उन्हें अपनाता नहीं है। और कोई शिक्षा संस्थान इस पर अध्ययन करने के लिए आगे नहीं आता।

आप में से कितने लोगों ने 'मरूता' का नाम सुना है या 'जुगाड़' का? कुछ साल हुए पंजाब के एक किसान ने सोचा कि मेरे पास जो डीज़ल का पंप है वो दिन में दो–तीन घंटे इस्तेमाल में आता है और बाकी समय यूं ही पड़ा रहता है। वो बड़ा बढ़िया काम करता है और गोल–गोल घूमने वाली चीज़ है मेरे पास, तो इसका इस्तेमाल गाड़ी बनाने में कर सकता हूं। और उसने गाड़ी बनाई – लकड़ी से उसकी बॉडी बनाई, नीचे स्प्रिंग लगाए, पुरानी जीप के पहिए कहीं से मिल गए वो लगाए, रेडिएटर लगाया और बन गई गाड़ी; जो 40–50 किलोमीटर की रफ्तार से चल सकती थी, लोग भी उसमें आ जा सकते थे और सामान भी ढ़ोया जा सकता था। और ऐसी गाड़ी बनाने में खर्चा हुआ बस तीस–चालीस हज़ार रूपए।

लोगों ने उससे पुछा कि भई तुम्हारी गाड़ी का क्या नाम है। उस बंदे का स्वभाव थोड़ा मज़ाकिया था। उसने कहा 'गड्डी दा नां – मरूता है मरूता'; (मारूति नाम का पुरूषीकरण)। उसकी गाड़ी को किसी और किसान ने देखा, उसने भी कोशिश करी और बना ली। जब उससे पूछा गया कि यह क्या है तो उसने कहा 'जुगाड़ है – जुगाड़'। पूरा पंजाब इनसे भर गया। इसमें लोगों को भी इधर से उधर लाने, ले जाने का काम शुरु कर दिया।

पंजाब से हरियाणा के लोगों ने सीखा और धीरे–धीरे हरियाणा भी भर गया। अभी पिछले साल जब मैं राजस्थान के एक इलाके में गया तो वहां भी दिख गई। लोगों को गर्व था कि उन्होंने ख़ुद इसे बनाया है। उन्होंने बताया कि अब तो यह सस्ती बनने लगी है – बीस हजार में ही बन जाती है। क्योंकि यहां सेना की पुरानी गाड़ियों का सामान काफी सस्ते में मिल जाता है। यह गाड़ी काफी तेज़ी से फैली है। लेकिन सवाल है कि मैंने अभी तक समाज विज्ञान में इसके प्रसार को लेकर किसी विद्वान द्वारा लिखा गया कोई लेख नहीं देखा। मैने कई संस्थानों और विश्वविद्यालयों के लोगों से कहा कि तकनीकी संस्थानों के विद्यार्थियों को एक प्रोजेक्ट लेना चाहिए कि वे 'जुगाड़' बना सकें। अगर आप जुगाड़ जैसी चीज़ बनाने लगेंगे तो इतनी मेकेनिकल इंजीनियरिंग सीखेंगे, बल आघूर्ण ;ज्वतुनमद्ध के बारे में सीखेंगे, पता नहीं क्या–क्या सीख जाएं... यह भी हो सकता है कि कोई यह सोचने लगे, इसके रेडिएटर कैसे डिज़ाइन होने चाहिए, इंजन थोड़ा ऐसा होना चाहिए, और हो सकता है कोई छोटा–मोटा उद्योग लग जाए इसके कलपूर्जे सप्लाई करने का।

यह तो एक सवाल है। उतना ही महत्वपूर्ण दूसरा प्रश्न है कि एक नवाचार कैसे फैलता है। अब जुगाड़ का तो कोई विज्ञापन नहीं हुआ कि जुगाड़ बन गया है, इसे ले लो। मुझे ऐसा लगता है कि भारत देश में किसी अच्छे विचार को फैलने के लिए रेडियो या टेलिविज़न की ज़रूरत नहीं होतीं, वो तो अपने आप ऐसे फैलती है जैसे कि कोई बीमारी। और यही हमारे समाज की शक्ति है। पर कोई उद्योग इस नवाचार पर काम करने के लिए तैयार नहीं है, न ही कोई संस्थान इस पर अध्ययन करने के लिए राज़ी है। ऐसी कई नवाचार आपको मिलेंगी।

मेरे कहने का मतलब था कि ऐसा नहीं है कि समाज में और उदाहण नहीं है पढाई के और तरीकों के बारे में। समाज ऐसे उदाहरणों से भरा पड़ा है। कुछ तो मैंने आपको बताए और कुछ आप भी सोच सकते हैं। हमारा समाज चलता ही इससे है तो फॉर्मल सिस्टम में हमने इस तरीके को छोड़कर बिल्कुल अलग कर दिया, उससे बिल्कुल रिश्ता ही तोड़ दिया। आगे हम कोई तरीका निकाल सकें कि अपने फॉर्मल सिस्टम में इस सिस्टम को इस प्रकार से जोड़ें कि पता ही न चले कि इंसान कहां से घुसा और कहां चला गया।

एडमिशन में लचीलापन लाया जा सकता है और अगर डिग्री सिर्फ योग्यता की हो तो इससे तो समाज में क्रांति आ सकती है। और मैं समझता हूं कि इस देश में यह हो सकता है, क्योंकि यह देश तो ज़िंदा ही ऐसे लोगों से है। इसके आधार में एक सीखने वाला एक बेहतरीन समाज है।

पद्म विभूषण प्रोफेसर यशपाल (१९२६-२०१७) वरिष्ठ अंतरिक्ष वैज्ञानिक थे जो भारत में विज्ञान को लोकप्रिय बनाने में हमेशा सक्रिय रहे। स्कूली शिक्षा में 'बस्ते के बोझ' को कम करने के लिए सरकार को सुझाव देने के वास्ते बनी 'यशपाल समिति' के अध्यक्ष थे। पूर्व में कई संस्थानों से संबंद्ध रहे : टाटा इंस्टीट्यूट ऑफ फंडामेंटल रिसर्च, बंबई में वैज्ञानिक थे। इंडियन स्पेस रिसर्च ऑर्गेनाइज़ेशन के 'स्पेस एप्लीकेशन प्रोग्राम' के निदेशक; विश्वविद्यालय अनुदान आयोग के चैयरमैन, भारतीय विज्ञान कांग्रेस के अध्यक्ष। आपको कलिंग पुरस्कार, लाल बहादुर शास्त्री राष्ट्रीय पुरस्कार और मारकोनी प्राइज से भी नवाजा गया।

यह लेख प्रोफेसर यशपाल के 1997 में भोपाल में दिए गए एक व्याख्यान का संपादित अंश है जो उन्होंने भोपाल में 'भारत हैवी इलेक्ट्रिकल्स' के सभागार में दिया था। यह एकलव्य, भोपाल द्वारा प्रकाशित 'शैक्षिक संदर्भ' पत्रिका के जुलाई–अगस्त 1997 अंक से लिया गया है।

A Free World Class Education for Anyone, Anywhere

Sal Khan

Don't limit a child to your own learning, for he was born in another time
~ Rabindranath Tagore

Sal Khan explains the origins of Khan Academy, a carefully structured series of educational videos offering complete curricula in numerous subjects. He shows the power of interactive exercises, and calls for teachers to consider flipping the traditional classroom script—give students video lectures to watch at home, and do 'homework' in the classroom with the teacher available to help.

My name is Sal Khan. I'm the founder and original faculty of the Khan Academy, an institution serious about delivering a free education to anyone, anywhere, and I'm writing this because I believe that the way we teach and learn is at a once-a-millennium turning point.

The old classroom model simply doesn't fit our changing needs. It's a fundamentally passive way of learning, while the world requires more and more active processing of information. The old model is based on pushing students together in age-group batches with one-pace-fits-all curricula and hoping they pick up something along the way. It isn't clear that this was the best model one hundred years ago; it certainly isn't anymore. Meanwhile new technologies offer hope for more effective ways of teaching and learning, but also engender confusion and even fear; too often the shiny new technology is used as little more than window dressing.

Between the old way of teaching and the new, there's a crack in the system, and kids around the globe are falling through it every day. Every day—every class period—the gap grows wider between the way kids are being taught and what they actually need to learn.

All of this is easily said, of course. For better and worse, everyone is talking about education these days. Politicians bring it up in every speech. Parents worry aloud that their children are falling behind relative to come vague, mysterious, yet powerful set of standards, or being shown up by a competitor two rows over halfway around the world. As in arguments about religion, there are fiercely held opinions, often in the absence of verifiable proof. Should kids have more structure or less? Are we testing too little or too much? And speaking of tests, do the standardized exams measure durable learning or just a knack of taking standardized exams? Are we promoting initiative and comprehension and original thinking, or just perpetuating an empty game?

Adults worry on their own behalf as well. What happens to our capacity to learn once our formal education is finished? How can we train our minds so that they don't become lazy and brittle? Can we learn new things? Where and how?

All this talk about education is healthy in that it affirms the absolutely central importance of learning in our competitive and connected worlds. The problem is that it is not translated into improvement. Where is the action, it often is top-down government policies that are as likely to hurt as help. There are amazing teachers and schools who have shown that excellence is possible, but their success has proven hard to replicate and scale. Despite all the energy and money spent on the problem, the progress dial has barely budged. This has led to a deep cynicism about whether education can be systemically improved at all.

Even more troubling, many people seem somehow to overlook the basic fact of what the crisis is all about. It's not about graduation rates and test scores. It's about what those things mean to human lives. It's about potential realized or squandered, dignity enhanced or denied.

It is often cites that American high school students now rank twenty-third in the world in science and math proficiency. From a U.S.-centric perspective, that's distressing; but these tests are a very narrow measure of what is happening in a country. I believe that, for the near future at least, the United States will maintain its leadership in science and technology despite any potential failings in our school system. Alarmist rhetoric aside, the U.S. is not about to lose its primacy

because students in Estonia are better at factoring polynomials. Other aspects of U.S. culture—a unique combination of creativity, entrepreneurship, optimism, and capital—have made it the most fertile ground in the world for innovation. That's why bright kids from all around the globe dream of getting their green cards to work here. From a global, forward-looking perspective, the national rankings are also somewhat beside the point.

But if alarmism is uncalled for, complacency would be downright disastrous. Even while America remains a powerhouse of innovation, who will benefit from it? Will only a small fraction of American students have the education they need in order to participate, forcing U.S. companies to import the balance of talent? Will a large and growing percentage of America's own young people remain un- or underemployed because they lack the necessary skills?

The same questions need to be asked on behalf of youth all around the world. Will their potential be squandered or channeled in dangerous directions because they weren't given the tools or the opportunity to grow the economic pie? Will real democracy in the developing world fail to gain a foothold because of bad schools and a corrupt or broken system?

These questions have both practical and moral dimensions. It's my belief that each of us has a stake in the education of *all* of us. Who knows where the genius will crop up? How can we justify *not* offering all children a world-class education, given that the technology and resources to do so are available—if only we can muster the vision to make it happen?

But instead of acting, people just keep talking about incremental changes. Either for lack of imagination or fear of rocking the boat, the conversation generally stops short of the kind of fundamental questioning that our education malaise demands, focusing instead on a handful of familiar but misplaced obsessions like test scores and graduation rates. What really matters is whether the world will have an empowered, productive, fulfilled population in the generations to come, one that fully taps into its potential.

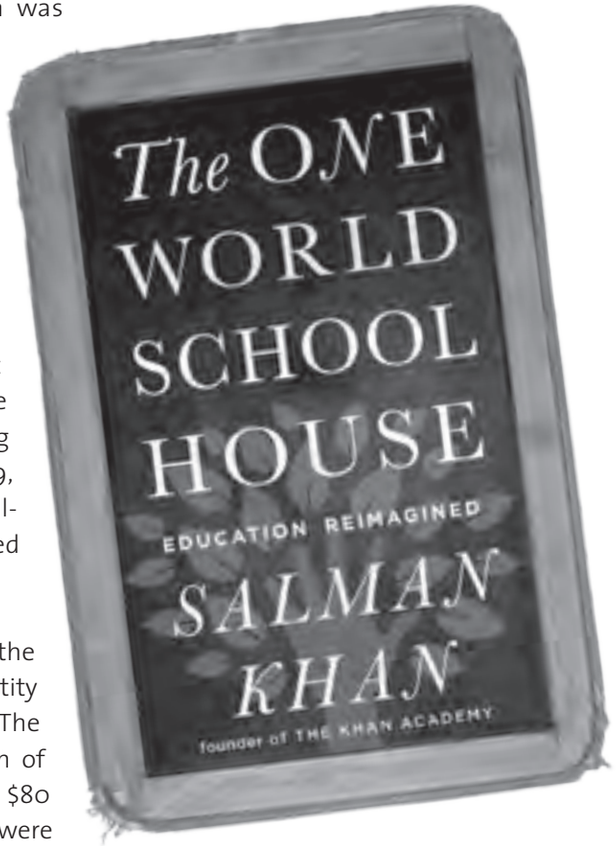
As we address this, we will revisit fundamental assumptions. How do people actually learn? Does the standard classroom model—broadcast lectures in school, solitary homework in the evening—still make sense in a digital age? Why do students forget so much of what they have supposedly "learned" as soon as an exam has been taken? Why do grown-ups sense such a disconnect between what they studied in school and what they do in the real world?

In 2004—somewhat by accident—I started experimenting with some ideas that seemed to be working. To a large degree, they were new incarnations of well-proven principles. On the other hand, coupled with the scalability and accessibility of new technologies, they pointed to the possibility of rethinking education as we know it.

Of the various experiments, the one that took a life of its own was my posting of math lessons on YouTube. I didn't know how best to do this, or if it would work at all, or if anyone would watch what I posted. I proceeded by trial and error (yes, errors are allowed) and within the time constraints imposed by a rather demanding job as a hedge fund analyst. But within a few short years it had become clear to me that my passion and my calling were in virtual teaching; in 2009, I quit my job to devote myself full-time to what had by then morphed into the Khan Academy.

If the name was rather grand, the resources available to this new entity were almost comically meager. The Academy owned a PC, $20 worth of screen capture software, and an $80 pen tablet; graphs and equations were drawn—often shakily—with the help of a free program called Microsoft Paint. Beyond the videos, I had hacked together some quizzing software running on my $50-per-month web host. The faculty, engineering team, support staff, and administration consisted of exactly one person: me. The budget consisted of my savings. I spent most of my days in a $6 T-shirt and sweatpants talking to a computer monitor and daring to dream big.

I didn't dream of creating a popular website or of being a flash-in-the-pan entry in the education debate. May be I was delusional, but I dreamed of creating



something enduring and transformative, an institution for the world that could last hundreds of years and help us fundamentally rethink how schooling might be done.

The time was right, I thought, for such a fundamental reexamination. New educational institutions and models emerge at inflection points in history. Harvard and Yale were founded shortly

after the colonization of North America. MIT, Stanford, and the state university systems were products of the Industrial Revolution and American territorial expansion. We are now still in the early stage of an inflection point that I believe is the most consequential in history: *the Information Revolution*. And in this revolution the pace of change is so swift that deep creativity and analytical thinking are no longer optional; they are not luxuries but survival skills. We can no longer afford for only some part of the world's population to be deeply education. With those things in mind, I composed a mission statement that was both wildly ambitious and—with the help of readily available but absurdly underutilized technology—completely attainable: *Provide a free-world-class education for anyone, anywhere*.

My basic philosophy of teaching was straightforward and deeply personal. I wanted to teach the way I wished that I myself had been taught. Which is to say, I hoped to convey the sheer joy of learning, the thrill of understanding things about the universe. Furthermore, I wanted to do this in a way that would be equally helpful to kids studying the subject for the first time and for adults who wanted to refresh their knowledge.

What I *didn't* want was the dreary process that sometimes went on in classrooms—rote memorization and plug-in formulas aimed at nothing more lasting or meaningful than a good grade on the next exam. Rather, I hoped to help students see the connections, the progression, between one lesson and the next; to hone their intuitions so that mere information, absorbed one concept at a time, could develop into true mastery of a subject. In a word, I wanted to restore the excitement—the active participation in learning and the natural high that went with it—that conventional curricula sometimes seemed to bludgeon into submission.

The Tipping Point

By the middle of 2012, Khan Academy had grown well beyond me. We were helping to educate more than six million unique students per month and this number was growing by 400 percent per year. The videos had been viewed over 140 million times and students had done nearly half a billion exercise through our software. I had personally posted more than three thousand video lessons—all free, untainted by commercials—covering everything from basic arithmetic to advanced calculus, from physics to finance to biology, from chemistry to French Revolution. We were also aggressively hiring the best educators and software engineers in the world to help. The Academy had become the most used education platform on the Web, described by Forbes as "one of those why-didn't-anyone-think-of-this stories...that is rapidly becoming the most influential teaching organization on the planet." Bill Gates had paid the high compliment of publically acknowledging that he used the site while working on math problems with his own kids.

What unmet needs was the Academy fulfilling?

A few short years ago, Khan Academy was known only to a handful of middle-school kids—relatives and family friends. How and why, from those intimate beginnings, did awareness of the site spread to a worldwide community of people of all ages and economic conditions who were hungry to learn? Why did students tell their friends, and eventually their teachers? Why did parents pass the word to their department heads? Why did parent adopt the site not only as a way to help their children, but also to refresh their own memories and appetite to learn?

Why was the Academy managing to motivate and excite students in ways that conventional curricula had failed to do? As to results, could we demonstrate, with real data, that the Academy was helping people learn? Did it boost test scores? Even more important, did the Academy's way of teaching help people retain their understanding for longer? Did it consistently help students move beyond their grade level in school? Were the video lessons and interactive software most useful as an add-on to the conventional classroom, or were they pointing the way to a fundamentally different future for education—above all, an *active and self-paced* future?

For each individual student, age eight or eighty, the next video would always be personal discovery. The next set of problems and exercise would constitute a challenge that each person could approach at his or her own tempo; there would be no shame or stigma in progressing slowly, no dreaded moment when *the class must move on*. The archive of videos would never go away; students could review and refresh as often as necessary. And mistakes would be allowed!

In a traditional classroom, you have the homework-lecture cycle, and then you have a snapshot exam. And that exam, whether you get 70 %, 80%, 90% or 95%, the class moves on to the next topic. And even that 95%student—what was the five percent they didn't know? Then you build on that in the next concept. That's analogous to learning to ride a bicycle. Maybe I give you a lecture ahead of time, and I give you a bicycle for two weeks, after which and say, "Well, let's see. You're having trouble taking left turns. You can't quite stop. You're an 80% bicyclist." So I put a big C stamp on your forehead and say, "Here's a unicycle."

But as ridiculous as that sounds, that's exactly what's happening in our classrooms. If you fast forward, you find good students start failing algebra all of the sudden, and start failing calculus all of the sudden, despite being smart, despite having good teachers, and it's usually because they have these Swiss cheese gaps that kept building throughout their foundation. So our model is: learn math the way you'd learn anything, like riding a bicycle. Stay on

that bicycle. Fall off that bicycle. Do it as long as necessary, until you have mastery. The traditional model, it penalizes you for experimentation and failure, but it does not expect mastery. We encourage you to experiment. We encourage you to fail. But we do expect mastery.

I passionately believe that the Khan Academy is a tool that can empower at least an approximate model of what the future of education should look like—a way of combining the art of teaching with the science of presenting information and analyzing data, of delivering the clearest, most comprehensive, and most relevant curriculum at the lowest possible cost.

The Zeal to Continue

Over the past few years, we have received thousands of email testimonials from students who have benefitted from the Academy. These messages have come from European cities, from American suburbs, from villages in India, from towns in the Middle East where young women, sometimes in secret, are trying to get an education. Some of these emails have been brief and funny; others have been detailed and heartfelt, sometimes from kids who'd been struggling in school and feeling bad about themselves, sometimes from adults who'd feared they'd lost the capacity to learn.

From all these many messages, certain themes have clearly emerged. Far too many bright, motivated kids are being badly served by their educational experiences—ones at elite, wealthy schools as well as underfunded ones. Too many kids are having their confidence trampled, even many "successful" students acknowledge that they've gotten good grades without learning much of anything.

More than anything, it is the student testimonials that have persuaded me to write this. I think of it as a kind of manifesto—both a very personal statement and a call to arms. Formal education must change. It needs to be brought into closer alignment *with the world as it actually is*.

For these students, the Khan Academy has been a haven, a place where they can do for themselves what their classroom and workplace experiences have failed to do. Can watching video lessons or using interactive software make people smart? No. But I would argue it can do something even better: create a context in which people can give free rein to their curiosity and natural love of learning, so that they realize they're *already* smart.

When and where do people concentrate best? The answer of course, is that it all depends on the individual. Some people are at their sharpest first thing in the morning. Some are more receptive at night. One person requires a silent house with music playing or against the white noise of a coffee shop. Given all these variations, why do we still insist that the heaviest lifting in teaching and learning should take place in the confines of a classroom and to the impersonal rhythm of bells and buzzers?

Technology has the power to free us from those limitations, to make education far more portable, flexible, and personal; to foster initiative and individual responsibility; to restore the treasure-hunt excitement to the process of learning. Quality education need not be dependent on showplace campuses. There is no economic reason that students everywhere could not have access to the same lessons as Bill Gates' kids.

I like to think of Khan Academy as a virtual extension of this One World Schoolhouse. It's a place where all are welcome, all are invited to teach as well as learn, and all are encouraged to do the best they can. Success is self-defined; the only failure lies in giving up. Speaking for myself, I have learned as much from the Academy as I have taught. I have gotten back—an intellectual pleasure, refreshed curiosity, and a sense of connection to other minds and other people—more than I have put in. It's my hope that every Academy student and every reader of this article will be able to say the same.

> *In 2004, Salman "Sal" Khan, a hedge fund analyst, began posting math tutorials on YouTube. 13 years later, Khan Academy has more than 42 million registered users from 190 countries, with resources that cover preschool through early college education, including tutorials on math, grammar, physics, biology, chemistry, economics, finance, history, art history, computer science, health, and more. Sal Khan holds three degrees from MIT and an MBA from Harvard Business School.*

Excerpts from Sal Khan's book, The One World School House: Education Reimagined , published by Twelve (imprint Hachette) in 2012.

Khan Academy website: https://www.khanacademy.org/

TED Talks from the author may be viewed through the following links:
https://www.ted.com/talks/salman_khan_let_s_use_video_to_reinvent_education
https://www.ted.com/talks/sal_khan_let_s_teach_for_mastery_not_test_scores

ZEKE PHILLIPS

5th GRADE ENGLISH

Excel Academy
Chelsea, MA

Zeke Phillips is a classroom craftsman—persistent and determined to get it right. "There are not many nine-year veteran teachers who still crave feedback on plans, course materials, and lessons regularly," says his principal. "Zeke's hunger to grow and develop has not done anything but get stronger."

His dedication shines through in the achievement of his predominantly low-income, Latino students at Excel Academy-Chelsea, one of two schools he has helped found. In the 2013-14 school year, Zeke's incoming fifth-grade class began the year with a Developmental Reading Assessment average of a 3.5 reading level, one-and-a-half years behind where they should have been. By the end of the year, students had an average reading level of 5.1 years, demonstrating over a year-and-a-half of progress in a single year.

Zeke's remarkable work hasn't been limited to any one type of school or grade level. After graduating from Harvard's Graduate School of Education in 2006, he taught for five years in New York, first at the Bronx Leadership Academy in NYC Public Schools and then at Democracy Prep Charter High School, before moving to Boston to found Excel Academy-Chelsea. In the 2015-16 school year, he is a founding ninth-grade English teacher at Excel Academy Charter High School. When asked about his variety of school environments, he says, "I've taken something different from each setting, as each school has provided me with opportunities to grow in ways I had not grown previously. I just really care about being in a good school."

Thoughtful and meticulous, Zeke is as adept at planning lessons as he is at challenging assumptions and reframing discussions in challenging ways. Spend an afternoon with Zeke, and you'll soon see why his kids love being in his class and why he's able to get them to believe deeply that "anything is possible."

In his essay "Giving Students the Mic," Zeke takes us inside a creative writing unit, showing us how structure and gentle guidance can help students write poems they are proud to perform for their classmates.

GIVING STUDENTS THE MIC:
POETRY AND PERFORMANCE IN THE CLASSROOM

If one of the hardest parts of writing is getting started, then one of the hardest parts of teaching writing is setting students up for take-off.

It's a Tuesday morning in late December, and students are buzzing. In a few hours, they will begin a long-awaited holiday break. Yet today, vacation is far from their minds. Instead, their voices bounce off the classroom walls as they rehearse their poems for the final time, gearing up for our big Poetry Slam.

Soon, we will file down the eighth-grade hallway to Community Circle and take our seats on the blue plastic chairs reserved for special occasions. Soon, each of them will stand up in front of the entire grade—the entire grade!—and perform their best poems. Soon, they will exhale.

Three weeks earlier, we had kicked off our poetry unit. For three weeks, I helped my students develop as writers of poetry—and see themselves as poets, using the texts in front of them as launching points.

In years past, my approach to poetry had felt like a fill-in-the-blanks puzzle: I prescribed what students wrote about ("Write a poem about winter") and how they wrote about it ("Start with a simile, add a metaphor, and shake for best results"). But real writing is messier, and I always had a nagging suspicion that we could do more. I was determined to move poetry writing—meaningful and messy—to center stage. If students can write poetry the way that poets do, they'll understand it more deeply. They'll enjoy it. They'll own it.

In my class, I give students specific strategies, tools, and feedback to build the flexibility and confidence necessary to be in command of their learning. This unit is emblematic of my larger approach: Students write high-quality poems that matter to them, not just to me. They develop the ability to write poetry without my support. They focus on the actual work of writing—and they feel proud enough to share what they create with a larger audience. It's about performance—about them stepping up and speaking out while I step back. I set the stage, but they hold the mic.

The Little Three

It begins on the Monday morning just after Thanksgiving break. I walk into class with the eagerness that comes from having an ambitious but untested unit plan.

My 28 students sit in rows, their desks neatly organized with pens and pencils in the grooves and their independent reading books in the corners, a simple but important routine that signals that everyone is ready for class. I kick off the unit with a question: "What do you know about poetry?"

They talk with partners to break the ice, and I strain to catch their words as I walk about the room. Soon, we come back together, and hands go up.

"Poems contain stanzas and lines," says one student—we'll call him Sammy. Many students snap.

"Poems don't always have to rhyme!" offers Nia. Murmurs of recognition echo through the room.

"I think that poems can be light and playful, but they can also be heavy and serious," says Lauren, tentatively. Many students nod.

"That's great. But how do we know a poem when we see one?"

We turn our attention to the handout and dig into two poems: "Let it Go," from the movie *Frozen*, and "This is Just to Say," by William Carlos Williams. In reading these poems, I want students to see that poetry contains key components that can both inform our understanding and influence our reading of this genre. Specifically, poems are about a topic, told by a speaker, and describe something about the topic. Topic, Speaker, Description—we call this a "Little Three," and we use this framework to capture what makes a poem.

But the work we're doing this morning isn't just about poetry. It's about having a tool to make sense of the world, complicated and confusing, all around us. In my class and across our network, we do this with all texts—we want our students to have a framework through which to understand more rigorous, complicated material. Because all of the tools we use to support writing in my class are simple and flexible, they push students to do the bulk of the thinking. As a result, these tools give students more ownership over their work while also making

"STRUCTURE SETS US FREE"

Much of my thinking about writing instruction and instruction more broadly, including the lessons I describe in this unit, has been heavily informed by Lucy Calkins of Teachers College and her Units of Study guides. Last summer, I attended a Summer Institute in order to learn more about her work. In one of the sessions, the presenter framed her approach to essay development as such: "Structure sets us free," she said, suggesting that we (and, more specifically, our students) need structure in order to have the space and freedom in which to do serious, heavy thinking.

This summer experience came on the heels of a visit I had taken to the classroom of Rue Ratray, a fellow teacher in the Boston area. In his classroom, his sixth graders wrote with confidence, flexibility, and energy in notebooks worn from heavy usage. That's all they really needed, he suggested—a text, a notebook, routine practice, and constant, in-the-moment feedback from their teacher—in order to do great, hard thinking. In fact, they'd do harder, more robust thinking because they had such purposefully simple tools.

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their thinking visible to me, allowing me to give better support along the way.

"There's much more to poetry than these three components," I say. "But this will be our foundation—one that will help us to do more with poetry than we've ever done before."

"No Struggle, No Progress"

"Raise your hand if you've ever written poetry," I say when we come back together for our second class of the day.

All hands shoot up.

"And raise your hand if you've ever tried to write a poem and had no idea where to start."

Students glance around at one another. Then, all hands go up again.

I nod. "We're going to be writing poetry in this unit, just like poets," I say. "And today, we're going to talk about how to get started."

We take out our notebooks. "Last night, I sat down to write some poems myself," I begin. "It's always easy to get stuck. But I started by thinking about people, places, and objects that matter to me—my father, my childhood home, and my wristwatch. I then thought about some of the moments that I associate with these subjects—the time my father had surgery, the time I practiced soccer in the basement, the time I ran a marathon and my watch timed me every step of the way. Finally, I turned these into 'Little Threes,' just like we used today in our reading, so that I could envision these moments as poems."

I show them my notebook. "Now I have this whole bank of poem ideas that I can choose from, and I can use these to write strong, powerful poems that look and feel like poems and that matter to me."

It's time for students to give it a shot. For the first time, they face a blank page, and I can sense their initial paralysis and fear. If one of the hardest parts of writing is getting started, then one of the hardest parts of teaching writing is setting students up for take-off. I want "productive struggle"—a balance made all the more complicated by varied skills, abilities, and confidence. Some students are ready to jump in. Others need more guidance. All, in some way, need support. That's why I've spent the first part of class introducing this brainstorming tool that all of my students should be able to use.

Still, I hold back. I want them to think. Some students look at the ceiling. Other students squint at my example on the board.

This year, Zeke was determined to move poetry writing—meaningful and messy—to center stage.

Still others start drawing webs in their notebooks. Once I see every student working, I make my way across each row, looking over every shoulder. Esme is brainstorming moments about her mom. Stephanie is brainstorming moments about her sister. Chris is brainstorming moments about his soccer ball. Matt asks if animals should be considered people or objects. I pause. "That's interesting; I hadn't thought of that. Maybe create a fourth category?" He nods, and starts brainstorming moments about his dog, Scruffy.

Confident that most students are starting to move, I zero in on Alex, Daniel, Adrian, and Julian. Alex's page is blank. Daniel looks physically pained. Julian is still writing his name at the top of his notebook. Adrian is trying to get his partner's attention.

I start with Alex. "Hey, bud," I say, kneeling next to his desk. He stares at his paper. Undeterred, I draw three circles on his notebook page. "Who's a person that matters to you?"

"I don't know," he says.

I pause. "That's okay," I say. "We have two other categories we can use. How about an object?" He shakes his head. "Aw, Alex! I know you like to ride your bike. And I know you've been using that cool pen recently. So let's choose—bike or pen?"

He says nothing at first, but something's starting to flash. After several seconds, it comes out. "Bike," he whispers, and writes that on his page.

"Okay!" I say. "Now we're moving. Think about two memories—just two for now—that you associate with your bike. Maybe the first time you got it, the first time you rode it, or a time you used it to ride somewhere. I'm going to check in with some of your classmates, but when I come back, I want you to tell me what you've come up with." He nods. I give him a fist bump. And then I take off.

I use a similar approach with Daniel, Julian, and Adrian, aware that today they need more support than they will later on. As the unit progresses, I'll step back.

Still, I know that others are ready for more. "That's excellent," I say to Joshua, pointing at his topic *(riding a roller coaster at Six Flags)*. Then I point at his description: *How I rode a roller coaster at Six Flags*. "Push this," I say. "What was that ride like?" He thinks for a moment, then crosses out his original description and writes below it: *How riding a roller coaster at Six Flags was scary but fun*. I tap his desk once, give him a thumbs-up, and continue on.

By the end of class, all of us are sweating. But pages are full. I ask students to share what they've generated with their partner, and their voices explode.

Over the next week and a half, I provide students with similar tools to practice additional skills in isolation: figurative language, imagery, sound devices. We do this not through worksheets, but in notebooks, building off the "Little Threes" they had already generated. Notebooks fill up with starts and stops and cross-outs. Hands go up often in these early lessons, with students either desperate to ask questions *(How do I do this again?)* or eager for reassurance *(Is this right?)*. And a number of students continue to face blank pages with blank faces, simply not sure how to get started.

But that was the point. This struggle is crucial to our progress, I tell students, alluding to the Frederick Douglass quote, not just for this task but for anything worth doing, and I want them to feel this challenge. My job, meanwhile, is to provide them with

just enough support to get off the ground and stay on track to acquiring these foundational skills. Seeing what they produce and where they struggle or stride along the way gives me the information I need to do exactly that.

We gain momentum. After a week and a half, ideas emerge more quickly. Stanzas and lines look sharper. Language becomes more vivid. And hands don't go up as frequently. Students have their notebooks, their tools, and their minds, and they're using all three. They are becoming poets.

Turning a Corner

We're two weeks into our unit. "Now, it's time to write extended poems—poems that we can not only be proud of, but that we can perform in front of one another," I say.

There's a gasp in the room and hands shoot up. I backtrack. "Let's not worry about the performance part yet. We'll get there."

If the first part of the unit is where we learn the discrete skills of poetry, then the second part is where we put it all together. Here, our focus shifts to the writing process. Over the next week and a half, our goal is to craft two larger poems that we will type, compile in a portfolio, and perform at a class Poetry Slam. This is what we've called our "Thanksgiving Feast" writing, which takes a long time to prepare and produce, as opposed to "Mac and Cheese" writing, which can be generated in a single sitting. I want my students to understand that good writing—or any deep learning—takes time, and that we need to work hard to get there. But the payoff, as with any great feast, will be worth it.

Over the next several classes, students take their two poems through the writing process—brainstorming, planning, drafting, revising, and editing. Throughout, I'm writing ahead of my students, taking two poems of my own through each step. I write so that I can anticipate the challenges my students might themselves encounter, but also so that my students can see what it looks like for writing to progress through the process we've outlined together. While students write, I focus on in-the-moment feedback; I want students to see, immediately, how to sustain and improve their work, stepping in just long enough to give students the tools to unlock deeper thinking.

Early in our project work, we're humming, but I'm worried about revision—one of the hardest parts of the writing process. We face a crucial question that all writers wrestle with: *How can I make my work even stronger?*

I tread lightly, providing students with a focus, a model of the process and product, and options for revising: They can write directly on their page or on a separate piece of paper. Then, I step back. Fear returns. We push on, but as I glance at my students' drafts over their shoulders, I don't think we've completely hit the mark. Some students lean over their work, marking up their pages with new lines and language to push their poems further. Other students raise their hands, not sure where to begin. We look at their poems together, and I give them specific suggestions, aiming to step back as quickly as possible and turn the thinking over to them. I want students to own their work—both product and process—and while we're making progress, we're not there yet.

Later that week, on a Friday morning wedged between the editing and publishing stages of their project, students are taking a reading quiz, and some finish early. On a whim, I give students the option of taking a piece of loose-leaf and writing additional poems for their portfolio. I'm not sure students will bite. But one hand goes up, then another.

I glance at poem after poem. They're not polished poems, but students are using—without prompting—the tools and devices from the past several weeks: Little Threes, figurative language, sound effects. This is the ownership I was looking for. Students keep raising their hands. It becomes trickier to navigate the classroom. "Mr. Phillips," they say, holding their loose-leaf in the air. "Look at this!"

For an event that's so much about words, it's the silence before each performance that stands out.

Showtime

Just over a week later, we're finalizing preparations for our Poetry Slam. We've typed our poems on computers and designed front and back covers for the portfolios in which we'll place the printed versions. We've devoted several classes to the performance itself: Students have watched a video of a high school student performing spoken word and analyzed the techniques that poets use to communicate their poems to an audience. They have identified how to best use eye contact, body language, volume, and energy when on stage. They have practiced their own performances with their partner.

In our final preparatory class, students stand by their desks, waving, talking, and laughing. Just like on the first day of this unit, when they shared what they knew about poetry, I strain to catch their words as I circulate the room. But now, these words are the words of *their* poems.

Only a few days earlier, Sara had raised her hand at the outset of our preparations. "I have a question," she said, looking tentatively around the room. "Do we all, um… *have* to perform?"

The "Little Three" gives Zeke's students a tool to take their poems from brainstorms to final drafts worthy of the spotlight.

I paused for a moment. "Yes," I said. "And you'll do great." If I wanted students to really *be* poets, they had to do this final step. I was making their participation mandatory with the hope that once they stepped on stage, whether nervous or confident, new or experienced, they'd be able to own it.

Before we leave for Community Circle that morning, I say some final words. "In a moment," I begin, "We'll kick off our Poetry Slam. You've been working so hard for this, and you're ready. Many of you may be nervous, and that's okay—that means you're on your game. Just think: In 40 minutes, we'll be back in this classroom, and you'll each have completed your performance.

"It's rare to have this opportunity in life, when it's just you, the stage, and the microphone." I look around the room. I want students to know that what we're about to do is about poetry, but that it's also about owning the work of your discipline. It's about stepping up. And so, before I finally step back, I say my final words: "Make the most of it."

We exit the room, file down the eighth-grade hallway to Community Circle, and take our seats on those blue plastic chairs. The lights are off. Two tall lamps stand at the front of the room, lighting a makeshift stage. A PowerPoint slide of a curtain is projected on the screen. Then, we begin.

Students are called to the front in alphabetical order, and they step onto the stage with their best poem in hand. For some, the paper shakes in front of their face. Others stand with feet firmly planted.

For an event that's so much about words, it's the silence before each performance that stands out. Audience members and performers alike seem to recognize how risky this moment is—and how full of opportunity. Students in the audience take in every word. They snap when they hear something they like. They give "good vibes" when they sense their classmate needs additional support.

Julian steps to the stage. He brings several months' worth of struggle with him, but his classmates know how hard he's worked in this unit, and how much he's improved. In class, they've seen him more focused than ever before, his eyes on the paper for longer stretches of time. They've seen him more engaged, his hand in the air more frequently. And they've seen him more confident.

But they haven't yet seen him here, in this kind of spotlight. Now, the room isn't just silent; all breathing has stopped. Julian looks out at the crowd. He takes his final deep breath, and starts to speak.

I stand in the background, shifting back and forth on my feet. I catch each of Julian's words, thinking, with each of them, how far he's come. When he finishes, he takes another deep breath, looks out at the crowd, and cracks a smile, full of pride and joy and relief. The silence prior to his performance was deafening. So is the applause that now fills the room.

Zeke Phillips is among the cohort of Fisher Prize winners from 2015. The compendium of winning essays from 2015 titled 'Students Centre stage' may be read from https://tntp.org/publications/view/teacher-training-and-classroom-practice/students-center-stage.

The Fishman Prize for Superlative Classroom Practice recognizes 100 inspiring public school teachers in the U.S. each year, and celebrates four winners who are making a profound difference for their students and schools. Winners receive a $25,000 award and participate in a thought-provoking summer residency with their peers, reflecting and writing about the issues facing their profession—and how they are tackling them in their classrooms.

Girls think of everything

Catherine Thimmesh

At first people refuse to believe that a strange new thing can be done, then they begin to hope it can be done, then they see it can be done—then it is done and all the world wonders why it was not done centuries ago
~Frances Hodgson Burnett

You burst into the world scrunched up and screaming. "It's a girl!" or "It's a boy!" the doctor announces. And so your life began. With those very first breaths, in those very first moments, your health and well-being were evaluated through the eyes of an ingenious inventor: Dr Virginia Apgar. She developed the Newborn Scoring System—or Apgar Score—to measure five critical aspects of a baby's health. She recognized the urgency of identifying those newborns in need of emergency attention, and because of her innovations, hundreds of thousands of lives have been saved. Today all babies get the Apgar Score within minutes of birth. So right from the get-go, a woman's invention and ingenuity touched your life. But that was only the beginning.

Whether in medicine or science, household products or high-tech gadgets, women invent—and their inventions surround us and affect our everyday lives. They have created cancer-fighting drugs, space helmets, coffeemakers, and disposable diapers. Women have invented games and toys and software programs. And each big-small invention of their have made life luxurious for all around.

Inventors create for a variety of reasons. Necessity is the mother of invention. An inventor sees a need and seeks to fill it. According to oral tradition and anthropological studies, women were responsible for some of the most fundamental and enduring innovations of all time. Owing to their function in the family and community, it appears that women were the first to invent tools and utensils. They spun cotton with flax, thereby creating cloth. The first to discover dyes to colour fabric and tanning methods to make leather goods. 14-year old Chinese

Grace Murray Hopper
Computer Compiler

No one thought it was possible. Giving computer commands in English—rather than mathematical code—was said to be ridiculous. But for mathematician and navy officer Grace Murray Hopper, such ideas were both logical and necessary. She created the first computer compilers that allowed automatic programing, which paved the way for high-level computer languages which made it possible for non-mathematicians to use computers for both business and private use. *'No one thought of that earlier because they weren't as lazy as I was. My colleagues liked to play with the bits, I just wanted to get jobs done. Programing in 0-1 was time consuming, and it was very easy to make mistakes. One incorrect number could ruin the whole program. It was so obvious. Develop one program that would do a lot of the basic work over and over again.'* In 1952, she developed the A-0 system—a program that could transform mathematical code into machine code. To do this, she plucked specific pieces of code from many programs and gave each piece an individual call number. She then combined the separate pieces of codes onto magnetic tapes. With the success of A-0 compiler, Murray moved ahead to develop the B-0 compiler—that could understand English instructions. Her innovative compliers ultimately formed the basis of COBOL, the first universal computer language. *'When you have a good idea and you know it's going to work, go ahead and do it,' Murray said, 'because it is much easier to apologize later than it is to get permission!'*

Bette Nesmith Graham
Liquid Paper®

It all began with a mistake. Maybe she typed a G instead of an H. Regardless, in her determination to solve her typing problems, Bette Nesmith Graham developed the liquid paper correction fluid—commonly called 'whitener'. At first, she tried to erase her typing errors, didn't work. *'I was doing some artwork for Texas Bank on a freelance basis, trying to make a little extra money. And in lettering, an artist never corrects by erasing, but always paints over the error. So I decided to use what artists use.'* Bette filled a small glass bottle with tempera water-based paint, matched its hue with the stationery background colour, and erased away her typos. Her coworkers were in awe and kept asking her for her 'miracle marking mixture'. Five years later, she began selling the liquid in little green jars with the label *'Mistake Out'*. It was a product that would revolutionize the business world and transform her from an executive secretary at Texas Bank & Trust into a self-made millionaire.

Ann Moore
Snugli®

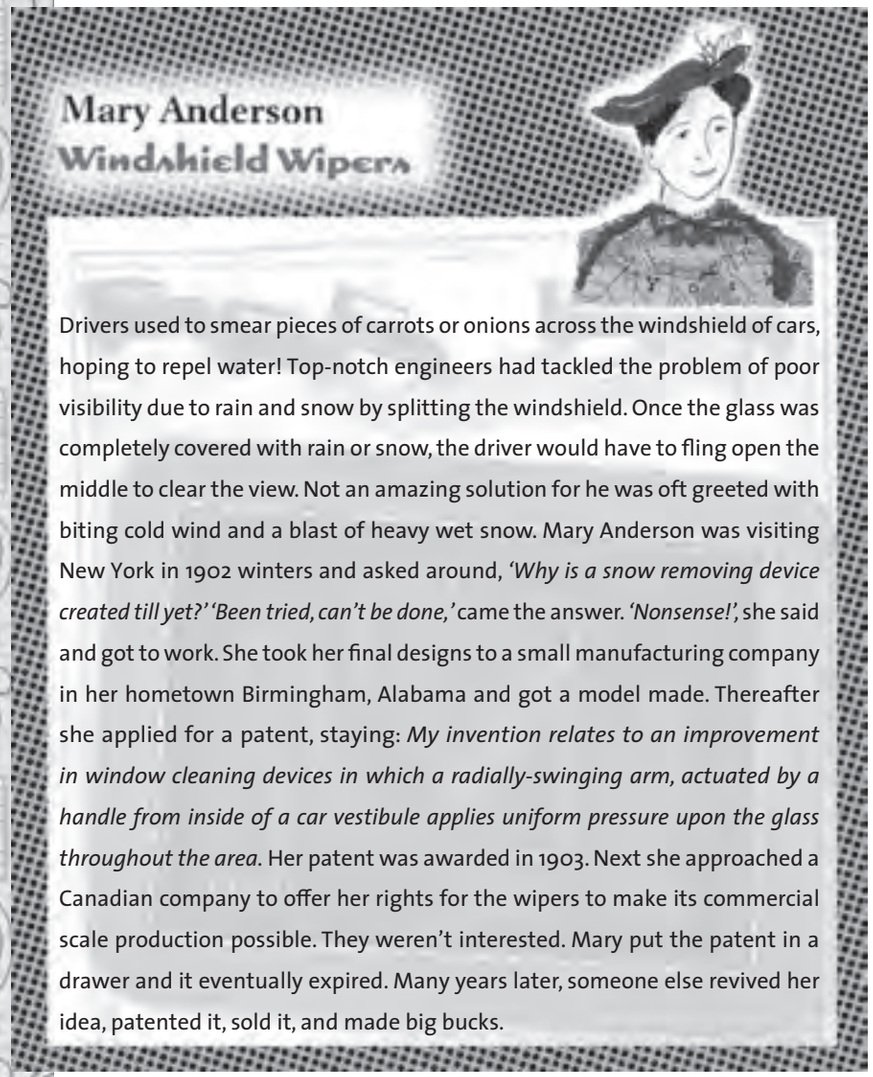
Parents and babysitters everywhere have struggled to hold and comfort their babies while attending to other tasks. What we needed, they joked, are more hands. What they got was better. It began in West Africa with pediatric nurse Anne Moore's 2-year duty tour in the Peace Corps, where she had plenty of opportunity to observe the bright cloth wraps the babies were wrapped in and slung on their mum's backs. Back home when she had her own baby, she took to recreating the baby carrier. *'I tried the African method. It's just a piece of fabric about 3 yards long. They balance the baby on their and then tie this long fabric piece around their chest and waist. I could never make that stay. After a little while, the baby would always slide down my back and I felt very insecure with that.'* So Ann sought her mother's help, who took reference from the photos from African trip fashioned a cloth baby carrier that was a cozy pouch with two holes for the baby's legs and shoulder straps to fasten onto the Anne's back. More functional and easier to wear it was. *'We had no thought of ever marketing it. It was just for me to have my hands free and have a happy baby. Everywhere I went, people would ask: Where can I get one? So my mother would make one for them, and I'd send it off. That's how it all started—just by word of mouth.'* By 1965 their carrier was mentioned in the trustworthy Whole Earth Catalogue, and sales amplified. Ann then formed a company with the help of her mother and husband. In 1970s hers were reviewed as the best baby carriers in a consumer survey and the company really took off. They began producing more reasonably priced factory made carriers in addition to the handmade ones. Ann's creation ultimately turned into a multimillion-dollar business: the Snugli baby pouch—a what-in-the-world-would-we-do-without-it sort of product.

empress His-ling-shi is credited with the discovery of silk, the oldest known textile in 3000 B.C.

Several inventions evolved out of general curiosity—a send of 'wouldn't it be fun if...' And then, of course, there are the accentual discoveries. Take the ice cream cone, for example. As the story goes, one day at the World's Fair in St Louis, Missouri in 1904 , a young lady (whose name remains a mystery) struggled to slurp her ice-cream sandwich while carrying a bouquet of flowers. So she took the top of the cookie and wrapped it around the flowers, creating an impromptu vase. Then she wrapped the remaining cookie around the ice cream so it wouldn't drip on her dress, and there it was—the very first ice-cream cone. An ice-cream vendor witnessed her ingenuity and used the trick himself when he ran out of bowls and was selling ice-cream cones to eager buyers.

Accomplishments of women have often been downplayed, skimmed over, or ignored together. In 1715, a Native American woman discovered a new method for cleaning and curing corn by using heavy pestles to hand-pound corn. Sybilla Masters who had observed her, was convinced this process would be easier if power-driven than the usual practice of grinding the corn between two millstones. Sybilla went to England to obtain a patent for her invention. Those days, women were not allowed patents in their own names, in fact, women did not legally own any property whatsoever and were themselves considered the property of their husbands. Therefore, she had to settle for obtaining the patent in the name of her husband, Thomas Masters. The patent awarded to Thomas read: a new invention found out by Sybilla, his wife, for cleaning and curing the Indian corn growing in several colonies in America.

Nearly a century later was the first U.S. patent awarded to a woman in her own name. Mary Dixon Kies got it in 1906 for the process of weaving straw with silk or thread, primarily for use in ladies' bonnets. This came at an opportune time since America had just placed an embargo on import of European goods. This increased the demand for Mary's hat manifold. Her invention alone heightened the New England hat business, which in turn boosted the region's overall economy.



Drivers used to smear pieces of carrots or onions across the windshield of cars, hoping to repel water! Top-notch engineers had tackled the problem of poor visibility due to rain and snow by splitting the windshield. Once the glass was completely covered with rain or snow, the driver would have to fling open the middle to clear the view. Not an amazing solution for he was oft greeted with biting cold wind and a blast of heavy wet snow. Mary Anderson was visiting New York in 1902 winters and asked around, *'Why is a snow removing device created till yet?' 'Been tried, can't be done,'* came the answer. *'Nonsense!',* she said and got to work. She took her final designs to a small manufacturing company in her hometown Birmingham, Alabama and got a model made. Thereafter she applied for a patent, staying: *My invention relates to an improvement in window cleaning devices in which a radially-swinging arm, actuated by a handle from inside of a car vestibule applies uniform pressure upon the glass throughout the area.* Her patent was awarded in 1903. Next she approached a Canadian company to offer her rights for the wipers to make its commercial scale production possible. They weren't interested. Mary put the patent in a drawer and it eventually expired. Many years later, someone else revived her idea, patented it, sold it, and made big bucks.

Against the odds, women have invented, succeeding when many thought they'd fail. C.J. Walker was born Sarah Breedlove to parents who were former slaves. Orphaned at the age of 7, married at 14, and widowed at 20, Sarah laboured doing other people's laundry for nearly 20 years. Her stars changed when she invented hair care products for African-American women and a new method for selling them. Sarah a.k.a. Madam Walker began her business with a single product, a lot of confidence, and $1.50. She went door-to-door giving free demonstrations and showing before-and-after photos of herself. Within 7 years, she had a thriving business. Madam C.J. Walker went on to become the first American self-made millionaire.

Today, in living rooms and labs, women are inventing. They are combining their curiosity and creativity with persistence and optimism. They are imagining. They are thinking and talking. And gradually their ingenuity is touching lives of both men and women alike.

Free from School

Rahul Alvares

It's not every day that a 16 year old writes a book. In fact, girls and boys of that age are supposed to spend their time studying what other people write. It is presumed that at that age they do not themselves have anything significant or interesting to say. And the education system guarantees just that. The best rewards go to those who can parrot set answers to set questions in examination halls. Those who try to use their imagination or reply differently are often punished with low grades.

Rahul Alvares did not set out to write a book. Under the encouragement of his parents, he consciously set out to try his hand at learning things outside the school framework and you might say as a result, 'Free from School' actually came looking for him! After his SSC, he opted out of schooling to follow his instincts: fond of reptiles, he chased them up at the Pune Snake Park and at the Crocodile Bank at Mamallapuram. In the process, he also picked up trails of spiders, earthworms and turtles. He caught snakes in the company of Irula tribals. He got bitten by hot-tempered reptiles. He came out of it all grinning and wiser. This is his story of a year out of school, when the learning graph of his young life went up leaps and bounds. He wrote it to encourage other boys and girls his age to move out of the sterile school and college environment offered by India's antiquarian educational system, if they wish to experience another side to life and learning. He lost nothing but gained a lot. When you read his story, hopefully so will you. A part of it is being presented here.

The First Halt

You must try to understand that when I finished school I was as raw as raw could be. I had never travelled anywhere on my own, never purchased a train ticket, since like most kids my age I had only travelled with my parents or relatives and they made all the decisions. I had no experience of how to handle money (my knowledge being limited to spending the little pocket money I would receive now and then). So while I had set my sights on travelling far and wide my parents wisely thought that I should begin by learning to manage on my own within Goa itself.

So I started out by helping at an aquarium shop in Mapusa, the town nearest my village. The proprietor of the shop is Ashok D'Cruz, a college friend of my father's. I must tell you about

Ashok. He is no ordinary businessman: keeping fish is a passion with him. He is far more interested in chatting with his customers about fish than making money selling them.

In fact, it was Ashok who introduced me to the amazing world of aquarium fish way back when I was just nine and studying in Class V. Under his guidance then, I experimented with breeding guppies, platties and mollies, fairly simple types of fish to breed. However, it was a matter of great excitement for me to succeed and Ashok was generous enough to even buy back from me the baby fish I reared just to encourage me. Later I developed sufficient confidence to experiment with and breed more difficult types of fish—all under the expert tutelage of Ashok.

So it was to Ashok's shop that I went every morning at 9, speeding on my bicycle to be on time. I would stay there until lunch time, a regular hands on, doing whatever I was asked to do. Ashok's shop is located away from the main market area so he does not have the advantage of casual customers dropping by. However, he has his regular customers and there are always at least twenty to thirty customers daily. During my first few days at his shop, my work was only to watch the tanks, clean those which were dirty, remove the dead fish and do some other small jobs. I also fed the fish and treated the wounded and diseased fish. Sometimes, I also attended to customers. Gradually, I began to accompany Ashok on his rounds to various clients.

One day my employer decided to send me as a spy to find out the prices of fish and fish food at a competitive fish shop. I tried to behave like a casual customer and walked coolly into the competitor's shop and gradually began to ask the prices of fish and fish food. After I had found out what was needed I bought a pair of cheap Black Mollies from his shop just to show him that I was a genuine customer. From the information I got, we found Ashok's to be comparatively cheaper than the competitor.

One of the important highlights of my experience at Ashok's was learning to make fish tanks. Ashok told me that since we were going through a slack period, he would teach me how to make them. I had to start from basics which meant purchasing glass for six tanks, having the glass pieces cut to specifications and then having the pieces delivered at the shop without a scratch. I had accompanied Ashok on several occasions earlier to the glass shop and watched as he ordered glass explaining his requirements, or having a piece re-cut because it was done wrongly.

In fact, I had been sent often to the glass shop for small purchases so I was fairly familiar with the owner and the procedures. Ashok had even taught me how to calculate the price of glass. Still it was a new experience for me when Ashok handed me some money and gave me general directions on what to do. I managed to purchase the glass and also to get it cut to size. Now came the difficult part of transporting the glass pieces to the shop. I wondered whether I should get a rickshaw for the purpose but was a little hesitant since I hadn't checked what it would cost for the trip, short though it would be. While I was trying to make up my mind by testing the package for its weight, the shopkeeper assured me that I would be able to handcarry the glass to Ashok's shop, which is what I finally did.

I started out. In the beginning, it was no problem. However, the package grew heavier and heavier as I trudged up the road with rickshaws, taxis and motorcycles honking away on all sides. With every step, I doubted the wisdom of my actions for my arms ached but I dared not put down the glass simply because it was glass. When I finally reached the shop and heaved a sigh of relief that the glass was intact, Ashok was horrified and understandingly livid for had I met with an accident, it would have been hell for him as he was responsible for me! I truly learnt an important lesson that day.

Learning to make an aquarium tank is great fun. One has to first plan the size of the tank. For this one must decide on the length of the tank. After that, the height and the breadth are to be proportionately calculated. The sides of the glass are held together with silicone, a glue which feels like rubber when it hardens. Silicone does not dissolve in water. The tricky part is being able to apply the silicone only to the edges of the glass and not letting your sticky fingers touch any other portions of the glass. Otherwise, the glass will look dirty, for the silicone marks will stay like a fingerprint on the glass forever. After the tank is resealed on the inside with silicone (to give double protection), it is left for a day to dry. The next day it is tested by filling with water and if all is well the tank is ready for sale and can be delivered to the customer. After I was taught how to do the first tank, I started helping with the rest. I recall how once by mistake I stuck the glass upside down. "There's something fishy about the looks of this tank," said Ashok. When he realized what my mistake was, he very nearly put me into the tank!

My first opportunity at testing my skills at finding out the reasons for "fish dying in an aquarium" (the most common complaint from customers) came when the manager of Hotel Osborne in Calangute asked Ashok to come and examine their aquarium on the hotel premises. Ashok was tied up that day, so he sent me instead. He gave me the manager's visiting card, directions to the hotel, some fish medicines and a pump to install in place of the old one if it was defective. I left in the evening for the hotel. I walked in proudly, with my head held high, as if I were a very experienced fish doctor. The manager told me which fish had died. I searched for disease symptoms but found none. I then realised that the problem was very simple and common: a case of overfeeding. Fish require food in proportion to their size but often people put more food than necessary into the tank. The extra food makes the water cloudy and polluted and this causes the fish to die. I cleaned the tanks, replaced

the pump, checked the filters and showed the hotel staff how to feed the fish. I even managed to sell them some fish medicines which they could keep as standby and made a bill for them on the bill book that Ashok had given me. They seemed satisfied with my work. I couldn't wait to tell Ashok about my experience.

Learning to Teach

January brought fresh experience for me and it happened entirely because of Hartman de Souza (Bing, as we affectionately call him). I was to return to Goa via Bangalore and since our good friends, Hartman and Ujwala had expressed willingness to accommodate me, should I need a place to stay for a while during my sabbatical, my parents suggested that I spend a few days in Bangalore. I was to stay at their place, sight-see the city, and inform my parents as soon as I was ready to return. This then was the general plan.

I reached Bangalore and Bing was at the bus-stand to pick me up. We drove to his house, me chatting away in reply to all his questions. After settling down to a good meal and generally relaxing, Bing told me that he had in mind a few people and institutions connected with my interest i.e., wildlife and that I should use my time in Bangalore to meet them. I agreed, little realizing that the people he suggested I meet would make their own suggestions about other people I should meet and when I would report this information to Bing, he would insist that I go and meet them as well. So I spent quite a few days meeting, or writing to, various persons connected with wildlife in Bangalore.

Bing is quite a hard taskmaster and he would not let me off easily; if the people were not in station at that time or, if the names suggested were not from Bangalore, I had to write to them instead. I wrote numerous letters as a result. The general purpose of this activity was that I should get an idea of what options were there for me if I decided to pursue a career in wildlife eventually. Bing also suggested that I should try to find out how and why these people decided to take to environment and wildlife studies, whether they were happy in their choices and so on.

Bing made several copies of an introductory cum reference letter for me which I was to give to the people I was to meet. The letter, which was signed by him, stated that I had taken a one year sabbatical to explore wildlife which I had done for the past eight months and that I would like to have a small interview with the person concerned. I also prepared small questionnaires to help me in the interviews. Bing would most often phone the person in advance and make the appointment for me. Sometimes he even reached me to the place. These meeting left me thoroughly enriched.

My stay in Bangalore also became very special because of the Times of India programme that Bing managed to arrange for me. The ToI in Bangalore has a special section called *Newspaper in Education*. NIE conducts workshops on varied topics in schools regularly. I went to the ToI on M.G. Road and after talking with the person in charge for some time about what I had been doing during the past year I was asked whether I would take a few workshops in some schools over the next couple of days. Although I was not too certain how well I would do this job, I agreed because if there is one thing I learnt during my sabbatical it is that one should always give a try to anything new because things are not always as hard as they might appear to be. So I said yes.

My first workshop was at Srivani Education Centre where I was to speak to the students of Class VIII. I was expected to speak for about 35 minutes and keep around 10 minutes for questions or discussion. I was a bit nervous at first but as the talk progressed and I found the students listening attentively, I talked more freely. After the first few schools went off well and I became accustomed to the routine I found myself enjoying these classes. I was even more pleased to learn that I would be paid Rs.100 per workshop plus my travel costs.

For the talk I would start by telling the students about my sabbatical, how the idea came up, the various places I had visited and the various things I had done so far. After that I would speak about two topics: vermiculture and snakes—because I thought that these would be of most use to the students. Vermiculture because they could practise this at home to process the garbage into compost and snakes because people have so many fears about them.

When I talked about vermiculture, particularly about mixing cowdung with soil, sometimes the girls and boys would find it distasteful and would make jokes about it or laugh at the idea and I would think that these are city kids and they don't know anything about cowdung. But still I would continue to explain how a vermipit can be set up in their homes. On snakes, I would first give general information about poisonous and non-poisonous snakes, and how to identify the poisonous ones. Then I would tell them what should be done if someone got a snake bite. I would also discuss the various beliefs that people have about snakes and which of them are myths. Depending on the time left, I would speak about other things too, like crocodiles, turtles or spiders.

At the end of the class, I would show them croc teeth, photos of myself with snakes, crocs, monitors, etc., and then my red-eared turtle that I always carried around with me in my bag. At this point there would be maximum excitement. Everyone would crowd around, some would ask to hold the turtle and they would ask questions about its eating habits, etc. I would allow them to touch the shell and nothing more because the turtle is very nasty and bites. In this fashion I took workshops at several other schools including National English School, Sindhi School, St. Mary's School, Bolivian Girls School and Bangalore International

School. I usually spoke to the students of Class VII to X. At Bangalore International School however the workshop was for the students of Class III and IV.

A few months later back in Goa I was pleased when the postman handed me a registered letter from NIE, Bangalore which contained a cheque for Rs.1075, my full earnings for giving the lectures. Later when I wrote an article on my one year sabbatical for the *Hindustan Times* I sent a copy to NIE and they too published it in their newsletter. *Newspaper in Education* has also invited me to take more workshops whenever I am in Bangalore.

You Have Sight, I Have Vision

I found that I had completed most of the things I had set out to do during my sabbatical though there were a few areas like honey bees for which definite programmes had not yet been worked out.

I busied myself during this time with writing out those special essays of the past couple of months that I had not yet completed (though my daily diary was up-to-date and in perfect order). I also set up the earthworm vermicompost pit in our backyard. It was my dad's idea that I should put into practice immediately the vermiculture that I had learnt, since managing garbage is becoming a problem in almost all households. His idea was that once I mastered the technique of setting up the vermipits by trial and error at home, I could set the same type up with little variations if needed for friends of ours and later for anyone who wanted this useful method of garbage management.

Dad suggested that I prepare a large vermipit which would be suitable for any family having a large compound like we have and also one or two small vermibeds which could be used by people living in flats who do not have lots of space of their own. We would keep all the pits going by putting waste into all of them from time to time and this way I could get experience on how the big and small pits both worked so that when people asked for such information I would readily have it.

So to start with I had to construct a vermibed. I began with the tank itself which was to be of brick. We had a labourer doing some odd jobs at that time at our house and he said he knew a bit about how to cement bricks together, so he and I constructed this 3' by 2' by 4' high tank of bricks. We mixed cement and sand in some rough proportion with water. Within a day we had the bricks placed one over the other with the cement mixture holding it all together. This was easy stuff I thought as I wrote out my record of how many bricks and the quantity of cement and sand we had used to construct the bed.

Next day, I dutifully wet the construction twice as instructed in order to have the cement set. Imagine my shock when on the third day I found that our entire tank was shaking and ready to collapse. I rushed off next door to my neighbour Guru who took one look at the tank and told me that we would have to take down the whole thing and start from scratch again. Apparently we had not used the right proportion of cement and sand mixture, nor laid the bricks right. Nor had we laid any foundation for the structure. Masonry was not that simple, I realized.

I immediately got down to carefully removing each brick without damaging it as the bricks were to be reused. Guru, the expert mason, then came over to construct the tank, and I helped. In fact, we built two tanks that day: one large and one medium. I then prepared the vermipits and Yesu, our maid, was instructed to henceforth put all the household wastes (except paper and plastic) into the pits, alternating between the different ones. We also started vermiculture in a wooden crate. Eventually the crate was used as a seed bed and a fine crop of jackfruit seedlings was raised in the box. The other two vermipits (of brick) function well, and all our household waste is processed by the earthworms.

At the end of February, I was eager and ready to set out again. Although some contacts for the study of beekeeping had been made by my dad, I was personally not very much interested in the subject. I was longing to get back to the snakes and crocodiles of Croc Bank. I also had another totally unrelated and unconnected programme, namely to improve my eyesight by taking a course on eye care and learning eye exercises at the Eye Clinic at the Aurobindo Ashram in Pondicherry. I have been wearing glasses since class IV. I fervently wished to rid myself of these glasses ever since I heard that with eye exercises one can improve one's eyesight.

I set out for Pondicherry. After treatment, the plan was for me to return to my favourite Croc Bank since Pondicherry is not very far from Mamallapuram, spend a few weeks, and return to Goa thereafter. By now I was quite familiar with the routes and did not need anyone to pick me up from the bus stops on arrival. At Ponsicherry bus stand, a cycle rickshaw fellow managed to cheat me of Rs.40 by promising to take me to Auroville but instead depositing me at Aurobindo Ashram which was more or less next door to the bus stop. I took a local bus to get to Auroville, over10 km away. The Ashram itself was an old building. Before you entered you had to leave your slippers outside and place a plastic tag, with a number, on them; another tag, with the same number, you carried in your pocket as you walked barefoot up the stairs of the ashram. The place reminded me of a retreat centre with people in meditative moods and soft Indian classical music playing continuously.

The first healing exercise was the most terrible one. I just reached the Centre after cycling in the sun when honey drops would be put in my eyes. I then had to stand sweating in the sun with my eyes burning because of the honey. (Honey is sweet on the tongue but burns in the eyes.) The next exercise would be struggling to read fine print in the dark with only a candle light burning. Next, one had to carry out the same exercise in normal sunlight, outside. There was an exercise involving

eye movement through the use of a small rubber ball, then the reading of a chart with letters and words of diminishing size in varying degrees, bathing the eyes with steam, much in the same way as inhalation is done, and then cooling the eyes with cold cotton packs. Finally, there was the colour treatment, where one stares at bright colours reflected over a lamp in a darkened room. Each exercise had to be performed a specific number of times with small details like opening, shutting and blinking of the eyes controlled to the finest degree.

There was no charge for the 10 day course at the Ashram but at the end of it I paid Rs.77 for the material needed to enable me continue with the exercises: 4 bottles of eyedrops, 2 small jars of honey, one rubber ball, two charts and two booklets with fine print. I benefitted a lot from the course and within a month or so, after regularly doing the exercises; I was able to read without spectacles. I still do the exercises, though not so regularly. The best part is that after having been a regular wearer of glasses, I now have to use my glasses only occasionally.

After the course was over, I set out for Mamallapuram to visit the Croc Bank once again. A funny, but expensive incident happened. I got to the interstate bus station and after asking around, I was directed to the Mamallapuram bus. Before I could reached the bus a man dressed in conductor's uniform walked towards me. "Where are you going?" he asked. "To Mamallapuram," I replied. "Come, come with me," said the man. We both got into the bus, I took a seat and he put my luggage on the overhead rack. "Ticket?" he demanded. "How much?" I asked. "25 rupees," he answered. I handed over the amount to him. Shortly after the bus had started on its way, and to my astonishment, another conductor appeared and started issuing tickets to the passengers. I explained that I had already paid Rs.25 to the other conductor only to find that there was no "other conductor", only a clever cheat who had taken me for a ride. I had to shell out another 18 rupees for my journey to the Croc Bank. What I found hard to accept was that the man was able to cheat me in front of all those passengers sitting in the bus. No one thought to tell me that he was not the real conductor!

Dream realised

A year had gone by since I had finished school and what an exciting year it had been. Having to go to college now seemed quite tame in comparison. But as I busied myself with filling up the admission forms, another surprise awaited me, and it came from a totally unexpected place. I was invited to be Chief Guest at an Environment Day function to be held in Belgaum on June 5, World Environment Day, where I was to speak on my experiences during the past year. This was surely the crowning event of my one year sabbatical.

The invitation came from Dileep Kamat who was one of the organisers. As he

explained, the purpose of the environment programme was to inculcate the idea that one can do things on one's own and one has to think out ways and means for this. So he was inviting a young person, whom the students could identify with, to speak on the occasion. The Committee had wholeheartedly approved when he suggested my name as I had done something quite unique during the past year; and the fact that my preference was in the field of ecology made me an ideal choice, according to them. I delightfully accepted the offer.

I started preparing my speech straightway as there was only a week left to go and I knew that I had do a good job as this was a big occasion for me. I wrote out my entire speech with help from my mum, and set to rehearsing it several times at home, such that when I left for Belgaum quite confident and well-prepared.

The function was held in the school hall. There were children from several schools already there along with their parents. I noticed my photos put up on a cardboard on one side of the hall. The hall was quite full when I entered. I was seated in front . The programme was compered by one of the students. It began with the prize winners of the elocution competition delivering their speeches—one in English and the others in Marathi and Kannada. Then one of the students introduced me to the audience and I was called up to the stage. I spoke in English and initially had to halt every little while for Uncle Dileep to translate what I had said into Kannada. Fortunately, after a few rounds of this English-Kannada speech it became obvious that the audience did not need the Kannada translation since they all understood English quite well. Then it became easier for me to continue and conclude my bit.

As done in the workshops I had conducted in the Bangalore schools earlier, I took out the red-eared turtle which I carried around for the audience to see at close quarters while my cousin took around a local turtle which those who wanted could handle. There were many students and parents who wanted to be photographed holding the turtles. I also showed the croc teeth to those who were interested. The compere then announced that they would like to get on with the rest of the programme, but in view of the fact that several students wanted to ask questions, a question-answer session would be held, after the programme of skits was over. I was called up to the stage to hand out prizes to the winners of the various competitions.

After this, came questions from the audience which I answered impromptu. I was quite happy to find that the audience had heard me attentively for there were many questions both from students and adults. Most of these concerned information about snakes. Next morning I was pleasantly surprised to find a local Kannada papers report the previous day's function. I was thrilled beyond words.

Later I wrote an article on my one year sabbatical for the *Hindustan Times* which appeared on the Youth Page. The same article was eventually carried by several other newspapers and magazines including *The Utusan Konsumer* in Malaysia. In my speech at Belgaum—in the workshops I had conducted at Bangalore schools—and in the article I wrote, I always recommended in conclusion that every student ask their parents for a break from regular studies when they finish school as this is something they would never regret.

And I wish to repeat here that June 1995 to June 1996 was the most wonderful year that I can ever remember. I learnt a lot, not only about the things I wanted to learn, but about many other things as well. And best of all I had a lot of fun and a whole lot of freedom to do all that I ever wanted to do. I certainly look forward to another sabbatical! And so, by now, should you!

Excerpts from the book Free from School, a memoir by Rahul Alvares, published by Other India Press in 2003.

बच्चे की भाषा और अध्यापक

प्रोफेसर कृष्ण कुमार

हमारे स्कूलों में 'बात करना' प्रायः गलत समझा जाता है। यह माना जाता है कि यदि कोई बात कर रहा है तो ठीक से पढ़ाई नहीं कर रहा होगा। इसलिए जैसे ही अध्यापक बच्चों को बात करता हुआ देखता है, वह तुरंत उन्हें रोकता है। बात करने की छूट बच्चों को सिर्फ आधी छुट्टी में रहती है जब अध्यापक कोई महत्वपूर्ण काम नहीं कर रहा होता है।

बातचीत के प्रति उपेक्षा की वजह से हम शिक्षा में बातचीत के उपयोगों की अवहेलना करते आ रहे हैं। यह स्थिति सभी स्तरों पर है, पर प्रारम्भिक स्तर पर यह सबसे स्पष्ट है। नर्सरी व प्राइमरी स्कूल में बच्चों के लिए बातचीत करना, सीखने और सीखी हुई चीज़ को सुदृढ़ बनाने का एक बुनियादी माध्यम है। सच तो यह है कि ऐसे अध्यापक, जो बच्चों को बात नहीं करने देते, किताबों व अन्य सामग्री के लिए पैसे की कमी की शिकायत करने के हकदार नहीं हैं। वे पहले ही एक ऐसा मूल्यवान साधन बेकार जाने दे रहे हैं जिसके लिए कोई पैसा नहीं खर्च करना पड़ता। इसलिए ऐसा स्कूल जहाँ छोटे बच्चे बात करने को स्वतंत्र नहीं, बड़ा फिजूलखर्च स्कूल कहलाएगा।

यही सही है कि बच्चे तरह–तरह के उद्देश्य लेकर बातचीत करते हैं और ये सभी उद्देश्य अध्यापक के लिए उपयोगी नहीं कहे जा सकते। उदाहरण के लिए बोरियत के मारे बात करने और दूसरे की निगाह से चूकी हुई चीज़ उसे दिखाने के लिए बात करने में फर्क है। दूसरी किस्म की बात बच्चे की सीखने की प्रक्रिया को बल देती है, जैसा कि दो बच्चों के इस संवाद में हो रहा है। ये बच्चे अध्यापिका की मेज़ के पास इंतज़ार में खड़े फुसफुसा रहे हैं और अध्यापिका रजिस्टर भरने में लगी है:

पहला बच्चा : देखा, आज बहनजी अंगूठी पहने है।

दूसरा बच्चा : तुमने पहले नहीं देखी?

पहला बच्चा : नहीं.... हां, हां, मैंने पहले देखी है।

दूसरा बच्चा : अरे लेकिन यह अंगूठी दूसरी है।

पहला बच्चा : बहनजी ने नई अंगूठी खरीदी है। यह पहले वाली से छोटी है।

दूसरा बच्चा : नहीं, पतली है।

यदि आप इसे छोटे–से संवाद का विश्लेषण करें तो सीखने की उन सम्भावनाओं को पहचान सकेंगे जो बातचीत के ज़रिए ही इन दो बच्चों को उपलब्ध हुईं। यदि पहले बच्चे ने अध्यापिका की अंगूठी देख कर बात न छेड़ी होती तो उसे यह याद करने का मौका न मिलता कि बहनजी पहले भी अंगूठी पहनती थीं। यदि यह बातचीत न हुई होती तो दूसरे बच्चो को पुरानी और नयी अंगूठी में फर्क देखने का अवसर न मिलता, न ही यह समझने का अवसर मिलता कि 'छोटी' और 'पतली' में क्या भिन्नतता है।

बातचीत के इन उपयोगों के प्रति सचेत होने के लिए ज़रूरी है कि हम बच्चों की बात सुनने की आदत डालें। यह कहना आसान है, पर इसे करना मुश्किल है क्योंकि बड़े यह मानकर चलते हें कि उनका काम बच्चों को निर्देश देना है और बच्चों का काम सुननता है। अच्छे श्रोता से मेरा आशय एक ऐसे व्याक्ति से है जो बात के सूक्ष्म उद्देश्य और बातचीत के कारण पैदा हुई सीखने की सम्भावनाओं को धैर्यपूर्वक पहचान सके।

किसी भी आम स्थिति में बातचीत में मस्त बच्चे ये दस क्रियाएँ करते नज़र आ सकते हैं:

1. जिस चीज़ पर अभी तक ध्यान नहीं दिया, उस पर ध्यान देना
2. किसी भी चीज़ को मोटे तौर पर या बारीकी से देखना
3. अपने–अपने निरीक्षणों का आदान–प्रदान करना
4. निरीक्षणों को तरतीब से लगाना
5. दूसरे के निरीक्षण को चुनौती देना
6. निरीक्षण के आधार पर तर्क करना
7. भविष्यवाणी करना
8. पिछले किसी अनुभव को याद करना
9. दूसरे की भावनाओं या उसके अनुभवों की कल्पना करना
10. किसी काल्पनिक स्थिति में स्वयं की भावनाओं की कल्पना करना।
11. अगर आप बच्चों की बातचीत को ध्यानपूर्वक सुनने की आदत डाल लें तो आप जल्दी ही इन दस और कई अन्य सम्भावनाओं में फर्क करने में समर्थ हो जाएंगे।

अध्यापक को बच्चों में यह विश्वास पैदा करना होगा कि वे बात करने के लिए स्वतंत्र हैं।

हर बच्चा यह महसूस करे कि जब वह कुछ कहेगा तो उसे सुना जाएगा और सभी बच्चे यह महसूस करें कि अध्यापक को उनका बोलना अच्छा लगता है।

कक्षा में बच्चों को बातचीत के लिए प्रोत्साहित करने के अवसरों को हम पांच कोटियों में रख सकते हैं :

1. अपने बारे में बात करने के अवसर देना

सब बच्चे अपनी ज़िन्दगी के बारे में – उन घटनाओं के बारे में जो हो चुकी हैं और उनके बारे में भी जो अभी नहीं हुई हैं – बात करने को उत्सुक रहते हैं, बशर्ते कि उन्हें इसके लिए प्रोत्साहन और मौका दिया जाए। कई अध्यापक बच्चों की व्यक्तिगत ज़िन्दगी और स्कूल में उनकी पढ़ाई के बीच कोइ सम्बन्ध नहीं देख पाते। वे इस बात पर ज़ोर देते हैं कि कक्षा में सिर्फ पाठ्यपुस्तकों में दी गई सामग्री पर ही चर्चा हो। अध्यापक की इस मान्यता के कारण कई बच्चे कक्षा में किसी भी किस्म की हिस्सेदारी नहीं निभा पाते। अध्यापक जिन चीज़ों पर चर्चा करते हैं, वे बच्चों को आकर्षित नहीं कर पातीं, ओर बच्चों के व्यक्तिगत अनुभव (जैसे किसी रिश्तेदार का आना, आंधी और बारिश में घर की हालत, या बीमार पड़ना) अध्यापक को रास नहीं आते।

2. स्कूली अनुभवों पर बात करने के अवसर देना

स्कूल का परिवेश खोजबीन और निरीक्षण का एक शानदार माध्यम है। स्कूल कहीं भी हो, उसके इर्द–गिर्द ऐसी कई छोटी–छोटी चीज़ें होती हैं जिनसे विस्तृत जांच ओर बहस की सामग्री मिलती है। दुकानें, पेड़, पत्थर, मकान, सड़क, बाड़, मिट्टी, फाटक, घोंसले, छत्ते, फूल, तितलियां, खुली नाली, नल और तमाम चीज़ें स्कूल के पड़ोस में ढूंढी जा सकती हैं और बारीक अवलोकन, अवलोकनों के आदान–प्रदान, सच के निर्धारण और दूसरी चीज़ों से उसके सम्बन्ध की खोज के लिए काम में लाई जा सकती हैं।

3. तस्वीरों पर चर्चा करना

ऐसी बातचीत जो सर्जना और विश्लेषण को प्रोत्साहित करती हो, तस्वीरों के ज़रिए अच्छी तरह की जा सकती है। तस्वीरें कैसी भी हो सकती हैं – अखबारों और पत्रिकाओं के विज्ञापनों या खबरों के साथ छपे चित्र, कैलेंडरों, टिकटों, लेबलों और पोस्टरों पर छपे चित्र। ये सभी काम मे ंलाए जा सकते हैं। इस प्रकार, तस्वीरों के स्रोत बहुत व्यापक हैं ओर किसी छोटे गांव में ढूंढे जो सकते है। अध्यापक साल–दर–साल इस्तेमाल के लिए तस्वीरों का एक संग्रह बना सकता है।

बच्चों के बीच बैठ कर बगैर किसी तैयारी के, बिल्कुल अनौपचारिक ढंग से किसी तस्वीर के बारे में बातचीत करना भी उपयोगी सिद्ध हो सकता है। लेकिन यदि हम देखने के विभिन्न पहलुओं के बारे में सचेत हो जाएं तो बच्चों की भाषा के विकास की दृष्टि से हम ऐसी बातचीत को ओर भी अधिक उपयोगी बना सकते हैं। अध्यापक का हर प्रश्न बच्चों की प्रतिक्रिया को एक निश्चित ढंग से प्रभावित करता है। सवालों के जरिए बच्चों की निगाह और प्रक्रिया को विस्तार देने की क्षमता हम किसी प्रकार हासिल कर सकते हैं ? प्रक्रिया के स्तर, जिनकी तरफ बच्चों का ध्यान हम प्रश्नों की मदद से मोड़ सकते हैं, ये रहे :

खोजियों की खबर

पांच या छह–बच्चों की टोली को स्कूल की इमारत के आसपास या भीतर किसी निश्चित चीज़ या जगह का अध्ययन करने के लिए भेजिए। जैसे वे पेड़ों के एक झुंड, चाय की गुमटी, टूटे हुए पुल या घोंसले का मुआयना करने जा सकते है। उनसे कहिए कि वे सावधानी से उस चीज़ की खोजबीन करें और अपने निरीक्षणों की आपस में चर्चा करें।

जिस समय खोजी–दल बाहर गया हो, बाकी बच्चों को उस चीज़ के बारे में विस्तार से बताएं। जैसे यदि खोजी–दल चाय की गुमटी का अध्ययन करने गया हे तो बच्चों को बताएं कि वहाँ क्या–क्या चीज़े उपलब्ध हैं (बच्चों से भी पूछें), उसे कौन चलाता है, वह उपलब्ध चीज़ें कहां–कहां से आती है आदि।

वापस आने पर खोजी–दल कक्षा के सवालों का साकना करें। प्रश्न पूछने में अध्यापक की बारी भी आनी चाहिए।

अगली बार किन्हीं और बच्चों का खोजी दल बनाइए।

अ. ढूँढना : इस स्तर पर हम बच्चों से केवल इतना कहेंगे कि वे चित्र में दिखाई गई चीज़ों को ढूंढे। हम इस तरह के प्रश्न पूछ सकते हैं : 'इस चित्र में क्या है?' 'क्या इसमें एक चूहा है?'

ब. तर्क करना : प्रतिक्रिया के इस स्तर का सम्बन्ध कारण बताने की क्षमता से है। चित्र में दिखाई गई किसी बात का जो भी कारण बच्चा बताए, अध्यापक को उसे स्वीकार करना चाहिए। अध्यापक स्वयं भी कारण बता सकता है – पर केवल एक सम्भव उत्तर के तौर पर, अंतिम उत्तर के तौर पर नहीं। प्रश्नों के उदाहरण : 'नन्हीं लड़की क्यों रो रही हैं?' 'मोटर–साइकिल का पिछला हिस्सा हमें दिखाई क्यों दे रहा?' 'चूहा क्यों छिपा हैं?'

स. आरोपण : इस स्तर पर हम बच्चे से खुद को चित्र में आरोपित करने को कहते हैं। अतः इस स्तर पर प्रश्न पूछने का उद्देश्य बच्चे को एक कल्पित स्थिति में स्वयं को डालने, कौन क्या कहेगा यह कल्पना करने, और उन्हें कैसा लगेगा यह सोचने को प्रोत्साहित करना है। प्रश्नों के उदाहरण : 'यदि तुम इस पेड़ पर बैठे होते तो तुम्हें क्या–क्या दिखाई देता?' 'छोटी लड़की साइकिल पर बैठे आदमी से क्या कह रही है?' 'चूहा क्या सोच रहा है?'

द. भविष्यवाणी : इस स्तर का सम्बन्ध चित्र में दिखाई गई स्थिति के बाद की घटनाओं का अनुमान करने से है। बच्चें को यह सोचने के लिए प्रेरित करना है कि अब आगे क्या होगा। प्रश्नों का उदाहरण : 'यह आदमी अब कहां जाएगा?' 'नन्हीं लड़की घर पर क्या करेगी?' 'वह घर कैसे पहुंचेगी ?'

ड. सम्बन्ध बैठाना : अब हम ऐसे प्रश्न पूछेंगे जो बच्चों को चित्र में दिखाई गई स्थिति से मिलती–जुलती कोई चीज़ अपनी ज़िन्दगी में ढूंढने को प्रेरित करें। प्रश्नों के उदाहरण : 'तुम कभी मोटर–साइकिल पर बैठे हो?' 'बैठकर कैसा लगता है?' 'क्या तुम भी किसी अजनबी के साथ रहे हो?' 'उस दिन फिर क्या हुआ?'

कहानियाँ सुन चर्चा करना

कोई कहानी सुनते वक्त हमारा ध्यान उसमें चित्रित घटनाओं और चरित्रों की तरफ भागता हैं। कई कहानियों का सम्बन्ध हमारी देखी हुई घटनाओं से नहीं होता, पर हम उनकी कल्पना कर लेते हैं। इसी तरह भले ही हमने कहानी के चरित्रों जैसे लोग कभी न देखे हों, फिर भी हम उनकी तस्वीर मन में बना लेते हैं।

कहानी सुनते समय हम घटनाक्रम ओर चरित्रों के व्यवहार की कल्पना करते चलते हैं। दूसरी तरफ जब हम स्वयं कोई कहानी सुनाते हैं तो उसमें शामिल अनुभवों को व्यवस्थित करते चलते हैं। कहानी चाहे असली हो या काल्पनिक, उसमें दो चीज़ें अवश्य रहती हैं : पहला, जीवन की घटनाओं, चरित्रों आदि का पुनर्योजन, और दूसरा, सुनने वाले का ध्यानाकर्षण। ये दोनों बातें भाषा के कुशल इस्तेमाल पर निर्भर हैं। दरअसल हर एक कहानी हमसे भाषा की चतुरता की माँग करती है और कहानियाँ सुनने का अनुभव हमें भाषा के चतुर कौशल के नमूने देता है।

अभिनव करना

कहानी और नाटक में सम्बन्ध है, इसलिए अध्यापक आसानी से एक को दूसरी से जोड़ सकता है। कहानी को सुन रहा बच्चा उसमें चित्रित भूमिकाओं को चुपचाप ग्रहण कर रहा होता है। यही चीज़ नाटक में होती है, पर अधिक मुखर रूप में। नाटक में बच्चों को विभिन्न भूमिकाओं को बातचीत, हाव–भाव और शरीर के जरिए प्रस्तुत करने के बहुत से मौके मिलते हैं।

नाटक बच्चों के लिए कोई विशेष या निराली चीज़ नहीं है – वह तो उनकी ज़िन्दगी भाग है। नकल उतारना, किसी चीज़ को बढ़ा–चढ़ा कर

बूझो, मैंने क्या देखा

एक बच्चा बाहर जाए, दरवाजे पर या कक्षा से कुछ दूर खड़े होकर आसपास दिखाई दे रही चीज़ों में से काई एक चुन ले। वह चीज़ कुछ भी हो सकती है – पेड़, पत्ता, गिलहरी, चिड़िया, तार, खम्भा, पत्थर। लौटकर वह उस चीज़ के बारे में सिर्फ एक वाक्य बोले, जैसे, मैंने एक भूरी चीज़ देखी।

अब इस बच्चें से एक प्रश्न पूछकर उस चीज़ का अनुमान लगाने का मौका कक्षा के हर बच्चें को मिलेगा। उदाहरण के लिए :

पहला बच्चा : क्या वह पतली है?
उत्तर : नहीं।
दूसरा बच्चा : वह कितनी बड़ी है?
उत्तर : वह काफी बड़ी है।
तीसरा बच्चा : क्या वह कुर्सी जितनी बड़ी है?
उत्तर : नहीं, वह कुर्सी से छोटी है।
चौथा बच्चा : क्या वह मुड़ सकती है?

अंत में सही अनुमान लग चुकने के बाद कुछ बच्चें को अपने प्रश्नों के उत्तरों से आपत्ति हो सकती है। उदाहरण के लिए किसी को यह आपत्ति हो सकती है कि रंग भूरा नहीं, मिट्टी जैसा था। ऐसी स्थिति में बारीक अंतर देख पाने में अध्यापक को बच्चों की मदद करनी होगी।

बताना, स्वांग करना जैसी नाटकीय युक्तियों का प्रयोग बच्चे करते ही रहते है। ऐसा बच्चा मुश्किल से मिलेगा जिसमें नाटकीय कौशल न हो। पर अनेक बच्चे अपने नाटकीय कौशल का कक्षा में प्रयोग करने को उत्सुक नहीं होते। ऐसा माहौल जिसमें नाटक सम्भव और सही लगे, कक्षा में अध्यापक की पहल से ही बन सकता है। पर माहौल बनाने की कोई एक तकनीक नहीं है। आप इसके लिए धीरे–धीरे प्रयास कर सकते हैं।

अध्यापक की प्रतिक्रिया

स्कूल में दाखिल होने तक बच्चे अपनी मातृभाषा की बुनियादी संरचनाओं पर अच्छा–खासा अधिकार पा चुके होते हैं। उन्हें न केवल तमाम तरह के कार्यों के लिए भाषा का प्रयोग करना होता है, बल्कि वे यह भी खूब समझ चुके होते हैं कि भिन्न–भिन्न सन्दर्भों और श्रोताओं के हिसाब से भाषा को समन्वित करना कितना जरूरी है। पांच वर्ष का बच्चा सन्देशों को कार्य में बदलना (जैसे, कहने पर पानी का गिलास लाना और उसे वापस सही जगह रखना) जानता है। वह लोगों की बातचीत की सहायता से उनके चरित्र और आपसी रिश्तों का अनुमान भी कर लेता है। छोटे बच्चे को ये क्षमताएं किसी के सिखाने से नहीं, रोज़ाना के जीवन से प्राप्त होती हैं। बच्चें के आसपास जो कुछ हो रहा होता है, वह उसे अपनी सोच–विचार की छलनी से छानकर अपने भाषा–संयंत्र का हिस्सा बना लेता है।

हमें ये क्षमताएं स्वयं हासिल करने का श्रेय बच्चें को देना चाहिए। हम बच्चें को कोई बिल्कुल

तुम कहाँ रहते हो?

बच्चे दो पंक्तियों मे आमने–सामने बैठते हैं। एक पंक्ति 'बताने वालों' की है, दूसरी 'सुनने वालों' की। पहली पंक्ति में बैठे हर बच्चे को अपने सामने बैठे बच्चे को समझाना है कि वह अपने घर कैसे जाता है। रास्ते को अच्छी तरह समझने के लिए सुनने वाला कितने ही सवाल पूछ सकता है। उदाहरण :

बताने वाला : सीधे जाकर मुड़ जाओ।
सुनने वाला : कितनी दूर तक सीधे जाना है?
बताने वाला : कूड़े के ढेर तक। वहाँ से मुड़ना है।
सुनने वाला : दाहिने मुड़ना है कि बाएं?
बताने वाला : दाहिने... नहीं, नहीं बाएं।

जब सभी बताने वालों की बारी आ चुके तब सुनने वाले बताने वाले बन जाएं और खेल फिर शुरू।

नई चीज़ नहीं दे सकते। केवल ऐसी परिस्थितियां बना सकते हैं जिनमें बच्चा अपनी मौजूदा क्षमताओं का और विकास कर सके। बातचीत के सन्दर्भ में ऐसी परिस्थितियां रचने की मुख्य शर्त है बच्चें की बात पर अपनी प्रतिक्रिया के प्रति सचेत होना। हर बार बच्चे की बात सुनते समय हमें चाहिए कि :

1. उसे पूरी बात कहने दें
2. वह जो कह रहा है उसमें रुचि लें,,
3. मतभेद व्यक्त करने की इच्छा हो तो उस पर काबू करें
4. बच्चें ने जो कहा है उस पर अपनी प्रतिक्रिया विस्तार से यानी, अधिक शब्दों में और ज्यादा समृद्ध वाक्य–रचना का इस्तेमाल करते हुए दें।
5. घटना की और जानकारी मांगें या बच्चें का ध्यान विषय के किसी नए पहलू की तरफ खींचें।

बच्चों से इस तरह बात करने के लिए काफी अभ्यास ज़रूरी है। सबसे ज़रूरी यह महसूस करना है कि बातचीत बच्चे के लिए सीखने का एक महत्वपूर्ण साधन है और उसका बच्चे के सामाजिक व्यवहार और व्यक्तित्व पर गहरा असर पड़ता है।

शिक्षाविद प्रोफेसर कृष्ण कुमार राष्ट्रीय शैक्षिक अनुसन्धान और प्रशिक्षण परिषद् के निदेशक रहे और आपके कार्यकाल में 'राष्ट्रीय पाठ्यचर्या की रूपरेखा २००५' का सृजन हुआ। वे एक लंबे समय तक दिल्ली विश्वविद्यालय में शिक्षा के प्रोफेसर रहे हैं। सामाजिक शास्त्र के माध्यम से भारतीय शिक्षा को परखने और स्कूल में पाठ्यक्रम के इस्तेमाल पर अपने लेखन के लिए प्रसिद्ध हैं। उनके लेखन में स्थानीय भाषा और राज्यों के बीच संघर्ष और बातचीत के पैटर्न का पता लगाते हैं। एक शिक्षक और द्विभाषी (हिन्दी और अंग्रेजी) लेखक के रूप में उन्होंने शैक्षणिक ज्ञान का सौंदर्य विकसित किया है जो आक्रामकता और हिंसा को कम करने की इच्छा रखता है।

यह लेख प्रोफेसर कृष्ण कुमार की 1986 में लिखी किताब *'बच्चे की भाषा और अध्यापक – एक निर्देशिका'* (प्रकाशक : संयुक्त राष्ट्र बाल कोष) का एक अंश है।

The Goal of Education Is to Help People Use Their Minds Better

Dr Howard Gardner

A lot of my work in the last few decades has been educational practice and policy and my primary affiliation is with the school of education and then more recently I've been moving, we might say into the area of vision and trying to envision the world different from the way it is.

On India and Mahatma Gandhi

Even as a young person, I was always interested in India. India going back for a millennia has been the seat of great civilisations, important idea, important practices, great art and it also happens to be the country in which the person who I think happens to be the most important human being for the last thousand years and that's the mahatma, Mahatma Gandhi. I think that the ideas Gandhi developed about how human beings relate to one another, what people do when they do not agree about things, about the kind of stance thet you have to be prepared to take in terms of your value system—incredibly important but it will probably take a long period of time to see whether or not the Gandhian ideas take hold both in Asia and in rest of the World.

My Work in Education

Let me be a little more specific about my own work. I was trained in cognitive psychology in particular—how human beings think about things and in developmental psychology—how our thoughts develop from childhood to later life and as part of that empirical work with young people and with other populations including brain damaged adults, I developed, 30 years ago, a theory called the Theory of Multiple Intelligences. And that theory posits that instead of there being a single general intelligence which people have in varying degrees, people have a lot of relatively independent faculties or abilities, which I call the Multiple Intelligences. Even though I saw this principally as a contribution to

psychology, in fact, the area where it has really taken off is in the area of education and there are multiple intelligence schools, classrooms and even networks of schools in many societies, including in India.

Education for Understanding

This interest in the part of educators led me to think more about how I conceptualized education and for me the important goal of education is to help people use their minds better to think about what's true in the world and what's not true, what's beautiful and hat may not so qualify, what's ethical and what's not. And I see school is the place where once we become literate, we acquire the various tools that people have developed over the years, the various academic disciplines, history, science, mathematics, the arts and the various professions—journalism, engineering, architecture that people developed to figure out how to understand the world and how to get things done. As a part of theory of multiple intelligences, I have thought a lot about individualism, how do we teach each human being so that he or she can learn the best and how do we assess each person so that he or she can show what they have understood and what they haven't understood about

truth, beauty, goodness and the like.

On Pluralisation: Presenting Ideas in different Ways

Also as part of my work education I have thought a lot about pluralisation and that means presenting important ideas in many many different ways. When there is an important idea whether it comes out of history or mathematics or the arts or politics, we can't just present it once, we have present it in many ways and many times. And the more different ways in which we present the ideas, the more intelligences that we can activate, the more likely there is that the person will really understand the idea, the topic, the theory we are talking about.

In my trip to India, I will speak a lot about developing minds, about education for understanding, about how to individuate and how to pluraise the things that we think are important.

On Excellence

What does it mean to be truly excellent in something. I've studied excellence in leadership—what it means to be an excellent leader, which includes management but goes beyond it because

leadership involves presenting visions of how the world should be and how the world can be. I've written a lot a about creativity—what does it mean to be an excellent creator, to come up with new ideas to implement them and to convince other people of those ideas. I've thought a lot about what it means to be an excellent worker, an excellent citizen. How can we not jut be technically proficient but also engaged in what we do and how we do it at a very high ethical and moral level.

And in my trip to India, I will talking about how we achieve excellence in leadership, in creativity, in work, in citizenship, and perhaps as I mention these areas, you can see why I'm so interested in Gandhi. Because Gandhi was tremendously creative, he was a very effective leader, and he thought more than anybody else about what it meant to be a citizen, not just of his state or his nation or his religion but of the entire planet. In an era of globalization, that ability to be non-parochial, to think broadly, to place oneself in the largest space, in the largest firmament is so crucial.

Five Minds for the Future

I want to talk about things I've been thinking about recently building my work in education, building my work on excellence. One thing I've been thinking about is what kinds of minds do we need to have going forwards in future. I've written a book called *Five Minds for the Future* in which I describe three cognitive areas and two human areas where I think we need to focus our education in the future.

The cognitive areas are the Disciplined Mind—what it means to become truly experts in an area, the Synthesizing Mind—how we put things together which are disparate, which don't necessarily immediately call themselves to be combines, but which needs to be integrated if we are to understand them and if we are to communicate to other people and when we live at a time with the deluge of information of all sorts, much of which is of poor quality, the capacity to synthesize is tremendously important.

The third kind of cognitive mind is the Creative Mind, the mind that thinks outside the box, that comes up with new ideas, with new practices. It's great to think outside the box but you can't do so unless you have a box! And the box is the discipline and the synthesizing you have done before you can be generally creative.

The last two kinds of minds have to do with the human sphere. I call them the Respectful Mind and the Ethical Mind. The Respectful Mind recognizes that we have tremendous diversity in the world, indeed tremendous diversity in any community of any size. And when people look and behave differently from us, we can try to kill them, we can ignore them, we can tolerate them, or we can try to work with them and clearly it is best for the world if we respect one another despite these differences, may be even because of these differences.

The Ethical Mind is the mind, which asks not just what rights do we have, (human beings are very good nowadays at stating their rights), but also what are our responsibilities, what are our duties and I am particularly interested in our responsibilities as workers and as citizens. If you are a professional of some sort—educator, doctor, engineer, architect, lawyer—what are your responsibilities. If you are a citizen of a community or a state, a nation, a region, the entire world—what are your responsibilities. And the Ethical Mind doesn't always get it right, but thinks a great deal about what it means to be a responsible worker and responsible citizen.

Curriculum: What and How We Teach

As an educator, I am also very concerned about curriculum. What is it that we teach and how do we teach. And as I mentioned before that I believe, in school, as we have become literate, it's our task to learn about what is true and what's not true, what is beautiful and cherished, and what is not good. These issues have become more complex in recent years.

On the one hand we have what we call the post-modern or relativistic critique, which says who am I or who are you to say what is good and beautiful and true—that is just a matter of taste—every country, every state, every group has its own definition of truth, beauty and good ness. And because in the technological world that we live in, the digital world, where anything that is posted can be changed, morphed, transformed, forgotten, combined, deleted, posted, and so on—it is very hard to think about truth, beauty and good ness—when we have such a fast changing, facile, flexible world. So in a book that I recently published called *Truth, Beauty and Good ness*, I've tried to think it through the traditional curricular goals in the traditional subjects in light of the post-modern critique on the one hand, and the very fast changing, flexible digital world on the other .

Use Intelligence for the Good

Finally, I've studied intelligence for many years. I find it a very, very fascinating topic but I've become convinced in recent years that the kind of human beings we are and the kind of societies we live in is really much more important than whatever kind of intelligence we have. Because people can be very smart on any definition but if they don't use their abilities and skills for the good, for trying to bring people together, for trying to work towards peace, for trying to eradicate poverty and disease and hostility, then the use of all that intellect is really for naught.

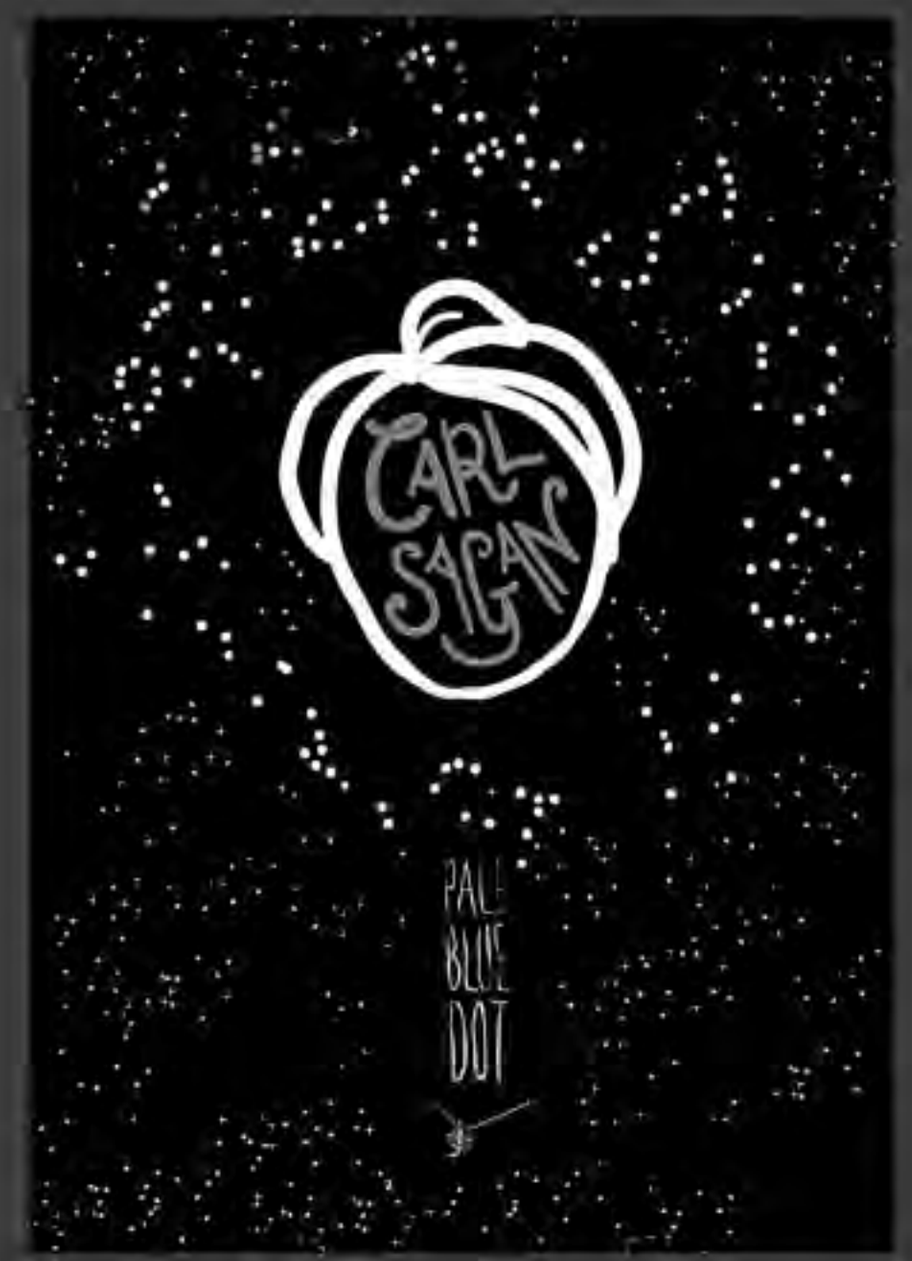
And I worry about this in terms of the United States, India, China—countries which have a tremendous focus nowadays on test scores in doing better in comparison, but perhaps not enough focus on what's it all for, what kind of place we want to live in, what kind of people we want to be, what kind of a world we want to create.

Here, as in so many other spheres, Gandhi has something to teach us. I found a nice quotation from Gandhi, he says: "I'm an average man with less than average ability. I admit that I'm not sharp intellectually but I don't mind. There is a limit to the development of the intellect but none to that of the heart."

Well I think in any definition, Gandhi was pretty smart. He's probably putting himself down when he says he's not of average ability intellectually, but whether or not there is a limit to the development of the intellect, there certainly shouldn't be a limit to the development of the heart . And coming to India next year, I want to look as deeply and widely as possible with the kinds of things you have cherished over the millennia and to figure out how all of us in the world can work together to have a world we would be proud to live in—with human beings that we can also feel good about.

Dr Howard Gardner, the father of the famed theory of 'Multiple Intelligences' and the legendary professor of cognitive psychology at the Harvard Graduate School of Education, is considered among the 100 most influential public intellectuals in the world.

Excerpts of the cover story published in *Mindfields* magazine, Howard Gardner Special Issue, November 2011



Look again at that dot. That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives. The aggregate of our joy and suffering, thousands of confident religions, ideologies, and economic doctrines, every hunter and forager, every hero and coward, every creator and destroyer of civilization, every king and peasant, every young couple in love, every mother and father, hopeful child, inventor and explorer, every teacher of morals, every corrupt politician, every "superstar," every "supreme leader," every saint and sinner in the history of our species lived there—on a mote of dust suspended in a sunbeam.

The Earth is a very small stage in a vast cosmic arena. Think of the rivers of blood spilled by all those generals and emperors so that, in glory and triumph, they could become the momentary masters of a fraction of a dot. Think of the endless cruelties visited by the inhabitants of one corner of this pixel on the scarcely distinguishable inhabitants of some other corner, how frequent their misunderstandings, how eager they are to kill one another, how fervent their hatreds.

Our posturings, our imagined self-importance, the delusion that we have some privileged position in the Universe, are challenged by this point of pale light. Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity, in all this vastness, there is no hint that help will come from elsewhere to save us from ourselves.

The Earth is the only world known so far to harbor life. There is nowhere else, at least in the near future, to which our species could migrate. Visit, yes. Settle, not yet. Like it or not, for the moment the Earth is where we make our stand.

It has been said that astronomy is a humbling and character-building experience. There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we've ever known.

Carl Segan (1934-1996) was a renowned astronomer, author and science popularizer who keenly advocated scientific skeptical inquiry and the scientific method, pioneered exobiology and promoted the Search for Extra-Terrestrial Intelligence (SETI). Sagan and his works received numerous awards and honors, including the NASA Distinguished Public Service Medal, the National Academy of Sciences Public Welfare Medal, the Pulitzer Prize for his book 'The Dragons of Eden', and, two Emmy Awards, the Peabody Award and the Hugo Award for 'Cosmos: A Personal Voyage'.

A poignant description of our Earth taken from the 1994 book by Carl Sagan, *Pale Blue Dot: A Vision of the Human Future in Space* which was inspired by the famous Pale Blue Dot photograph.

Could subjects soon be a thing of the past in Finland?

Penny Spiller

Finland has long been renowned for the quality of its education and always scores highly in international league tables.

Now it is rethinking how it teaches in the digital age–seeking to place skills, as much as subjects, at the heart of what it does. But not everyone is happy, and there are fears it could bring down standards.

What's unusual about Finnish schools?

- Teaching is a highly respected, well-paid profession
- There are no school inspections or teacher evaluations
- The school system is highly centralised and most schools are publicly funded
- School days are short and the summer break is 10 weeks
- Children are assessed by their teachers. The only nationwide exam is for those who continue studying to 18
- Average school size is 195 pupils; average class size is 19 pupils
- Success has been attributed to a traditionally high regard for teaching and reading, as well as a small, largely homogenous population
- Though still high, Finland has been slipping down the Pisa rankings in recent years
- Like other nations, it faces challenges of financial constraints and growing immigration

It is a chilly morning in a remote village in southern Finland, but the thoughts of this class of 12-year-olds are elsewhere—in ancient Rome. Their teacher is taking them through a video re-enactment—shown on the classroom's interactive smart board—of the day Mount Vesuvius erupted and destroyed the city of Pompeii. In groups they take out their mini laptops. Their task is to compare ancient Rome with modern Finland. One group looks at Roman baths and today's luxury spas; another puts the Colosseum up against modern-day stadiums.

They use 3D printers to create a miniature of their Roman building, which will eventually be used as pieces for a class-wide board game. This is a history lesson with a difference, says Aleksis Stenholm, a teacher at Hauho Comprehensive School. The children are also gaining skills in technology, research, communication and cultural understanding.

Exercise balls replace chairs in this classroom

Finland has one of the best education systems in the world

"Each group is becoming an expert on their subject, which they will present to the class," he explains. The board game is the culmination of the project, which will run alongside normal classroom teaching.

How Finland has shaken up teaching for the 21st Century

For nearly two decades, Finland has enjoyed a reputation for having one of the world's best education systems. Its 15 year olds regularly score amongst the highest in the global Pisa league tables for reading, maths and science. Its ability to produce high academic results in children who do not start formal schooling until the age of seven, have short school days, long holidays, relatively little homework and no exams, has long fascinated education experts around the world. Despite this, Finland is shaking up the way it is doing things—a move that it says is vital in a digital age where children are no longer reliant on books and the classroom to gain knowledge.

In August 2016, it became compulsory for every Finnish school to teach in a more collaborative way; to allow students to choose a topic relevant to them and base subjects around it. Making innovative use of technology and sources outside the school, such as experts and museums, is a key part of it.

The aim of this way of teaching — known as Project-or-Phenomenon Based Learning (PBL)—is to equip children with skills necessary to flourish in the 21st

Century, says Kirsti Lonka, a professor of educational psychology at Helsinki University. Among the skills she singles out are critical thinking to identify fake news and avoid cyber-bullying, and the technical ability to install anti-virus software and link up to a printer.

"Traditionally, learning has been defined as a list of subject matters and facts you need to acquire - such as arithmetic and grammar - with some decoration, like citizenship, built in around it," Ms Lonka says, "But when it comes to real life, our brain is not sliced into disciplines in that way; we are thinking in a very holistic way. And when you think about the problems in the world—global crises, migration, the economy, the post-truth era—we really haven't given our children the tools to deal with this inter-cultural world. I think it is a major mistake if we lead children to believe the world is simple and that if they learn certain facts they are ready to go. So learning to think, learning to understand, these are important skills - and it also makes learning fun, which we think promotes wellbeing."

How Finland is ditching classroom traditions

Hauho Comprehensive School is nestled among forests and lakes, some 40 minutes' drive north-east of the city of Hameenlinna. With just 230 pupils aged between seven and 15, it has a homely feel. Shoes are left at the front entrance, exercise balls are used instead of chairs in some classrooms, and there are pull-up bars in the doorways.

Teachers are relaxed about mobile phones in the classroom; it is a chance, they say, for children to appreciate their value as a research tool, not just as a means for communicating with their friends. On this cold day, the older students huddle around their phones during the lunch hour while some of the younger children brave the snow flurries to use the skate park, football and basketball pitches.

School are relaxed about the children using their mobile phones in class as well as in the lunch hour

The school's skate park came from an idea suggested by the children, who helped design and raise funds for it

Head teacher Pekka Paappanen is a firm believer in PBL and looks for a variety of ways of integrating it into the school's curriculum.

"I talk through ideas with our teachers, and then I make sure there is time and space in the schedule for them to happen," he explains, "I think teachers have more power in this way, but they have to realise they can't do everything. We are leaving some old traditions behind, but we are taking it slowly too—the job of teaching our children is too important and we mustn't get it wrong."

Tackling Europe's biggest issues in class

One big project last year was on the subject of immigration, when the flow of migrants into Europe was making headlines around the world. Aleksis Stenholm says they chose the topic because it became clear many of their students had little personal experience of immigrants and immigration. The topic was incorporated into German and religious classes.

Their 15-year-olds carried out street surveys to garner local opinions about immigration, and they visited a nearby immigration centre to interview asylum seekers. They shared their findings via video-link with a school in Germany, which had carried out a similar project.

"It was really powerful, how the students reacted to it. They started thinking about things, questioning their opinions," Mr Stenholm recalls, "If I had just taught this over, say, the course of three lessons, the effect would have been very different."

But does it work?

The idea behind phenomenon-based learning has its critics. Some, like physics teacher Jussi Tanhuanpaa, fear it does not provide children with a strong enough grounding in a subject to enable them to study it at a higher level. He teaches in Lieto, just outside the south-west city of Turku, and says that of one cohort of children he knew who took advanced-level maths post-16, some 30% of them had to drop down a level. He also worries it is widening the gap between the most and least able students —a gap that has been historically small in Finland.

The children linked up with German pupils to compare their understanding of immigration

A smart board and tablet computers are used for this lesson on climate change

"This way of teaching is great for the brightest children who understand what knowledge they need to take away from an experiment. It allows them the freedom to learn at their own pace and take the next steps when they are ready to," he says, "but this is not the case for children who are less able to figure it out for themselves and need more guidance. The gap between the brightest and the less able has already begun widening and I am very afraid that this will only get worse."

Others worry that it is also adding to teachers' workloads and is disadvantaging older teachers who may not be as digitally able as their younger counterparts. Jari Salminen of Helsinki University's faculty of education says similar types of learning have been tried in the past—as far back as 100 years ago—and have failed.

"Many international visitors are asking me, why are you changing this system when you get such good results? And it's a mystery to me, because we don't have any data from school level that phenomenon-based learning is improving results," Mr Salminen says.

Anneli Rautiainen of Finland's national agency for education accepts there are concerns and says they are introducing the changes gradually: schools are only required to provide one such PBL project for its pupils a year.

"We want to encourage teachers to work in this way and for children to

experience it, but we are starting it slowly. There are still subjects being taught and goals to be reached for each subject, but we also want skills to be embedded in that learning," she explains.

But what about results?

"We are not too keen on metrics in this country overall so we are not planning to measure the success of it, at least not for now. We are hoping it will show in the learning outcomes of our children as well as in the international tables such as Pisa," she says.

While not everyone is convinced by this revolution in Finnish teaching, it has been given the thumbs up by most students and parents at Hauho.

Sara, 14, says it is "not so tiring. It's much more interesting—I like that about it." Anna, also 14, says her older sister is envious because she thinks "school is much more fun than when she was here."

Mum Kaisa Kepsu says most parents she knows are positive about the changes to the curriculum. "There has been a wider discussion about the need to ensure children are still learning the basic facts, and I agree with that," she says, "but raising their motivation and making the world more interesting is also important.

Pens and paper are still an important part of classroom life

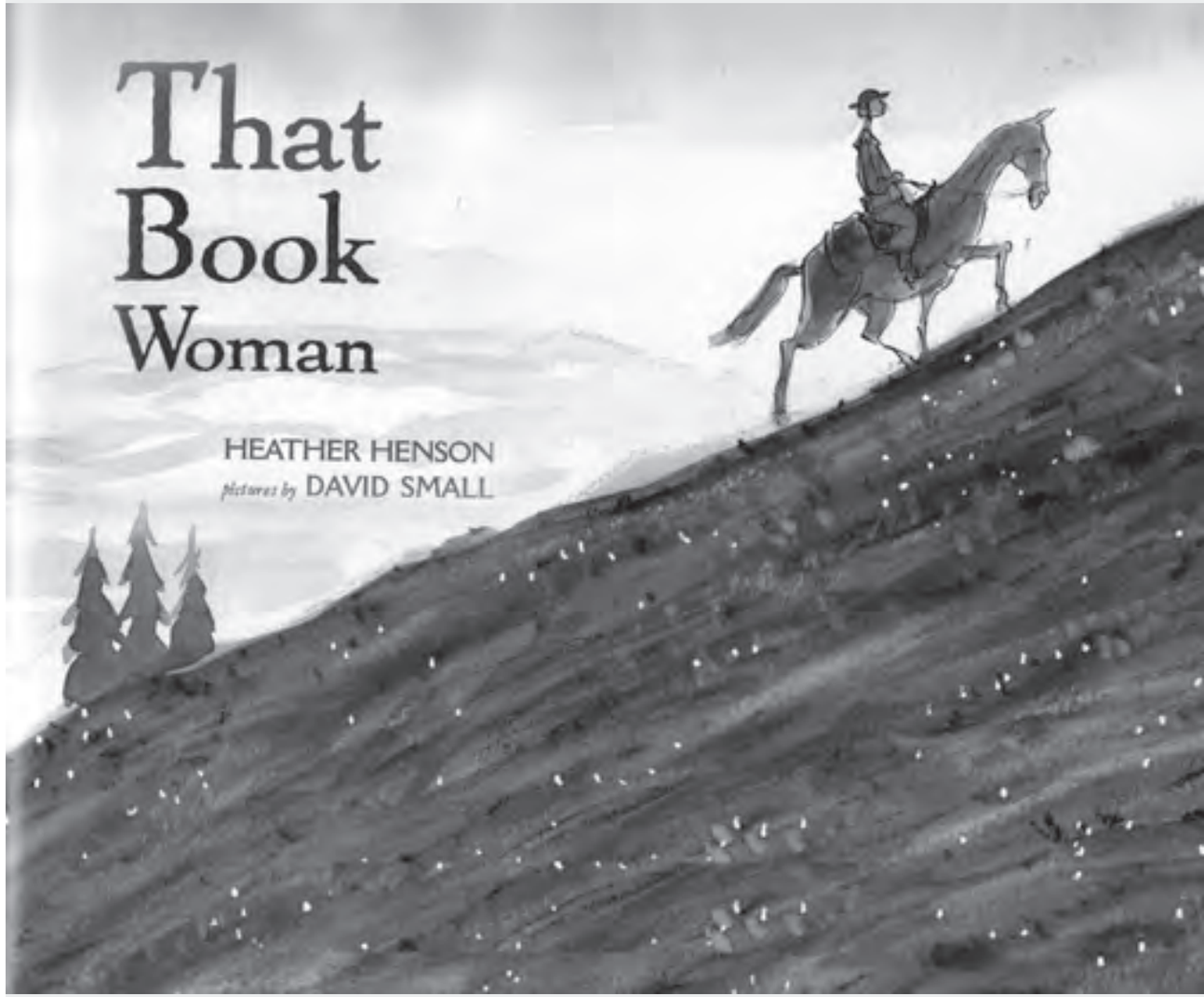
...so too are arts and crafts

I don't see anything wrong with school being fun."

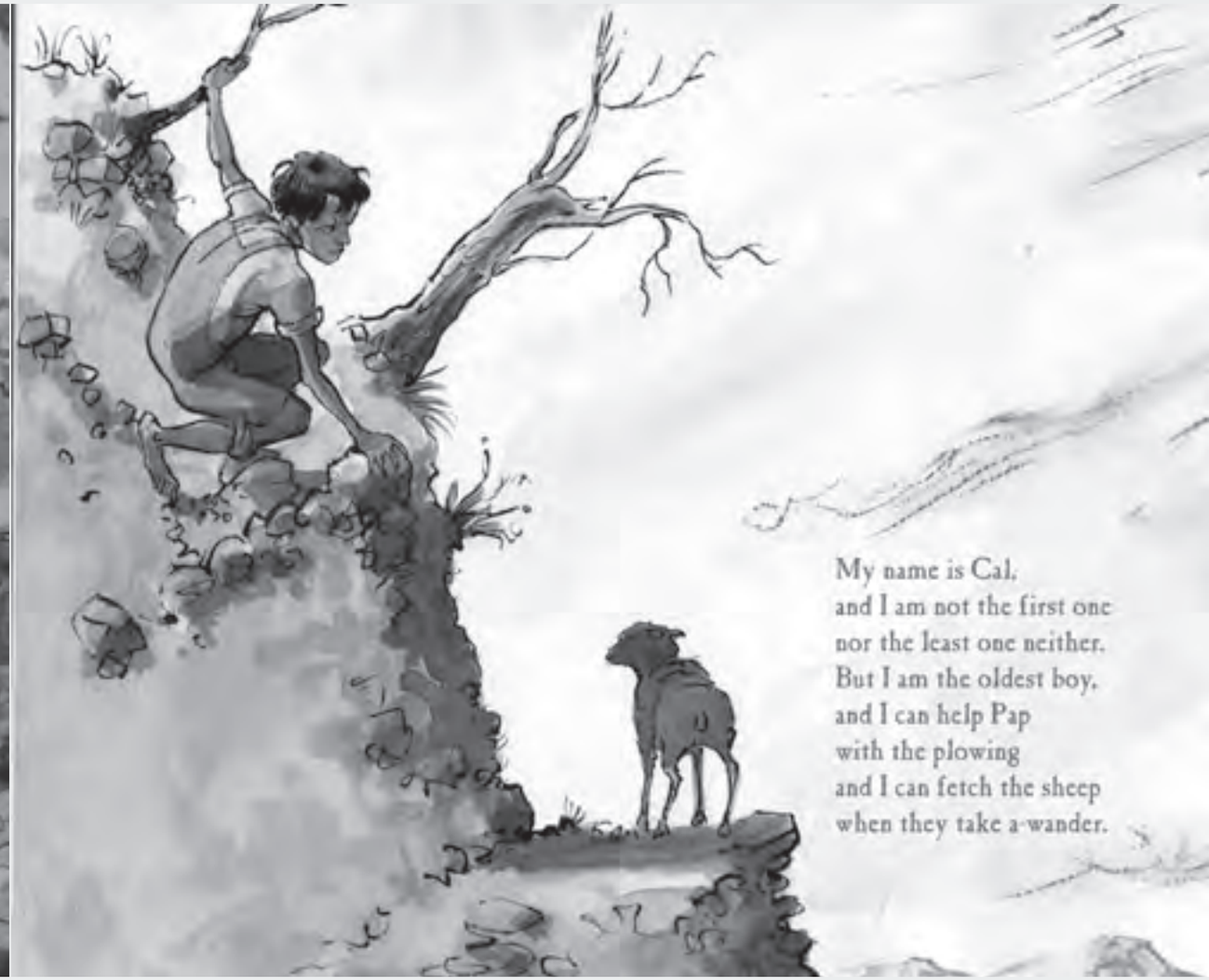
Could this approach work elsewhere in the world?

There is no compelling evidence that Project/Phenomenon Based Learning is a more efficient way of teaching. Neither does anything prove that PBL had a positive impact on pupils' literacy or their engagement with school and learning. However, the independent evaluators did find that—from observations and feedback from schools—it could enhance pupils' skills in communication, teamwork and self-managed study.

A story by BBC News, *Finland,* published on 27 May 2017



That Book Woman

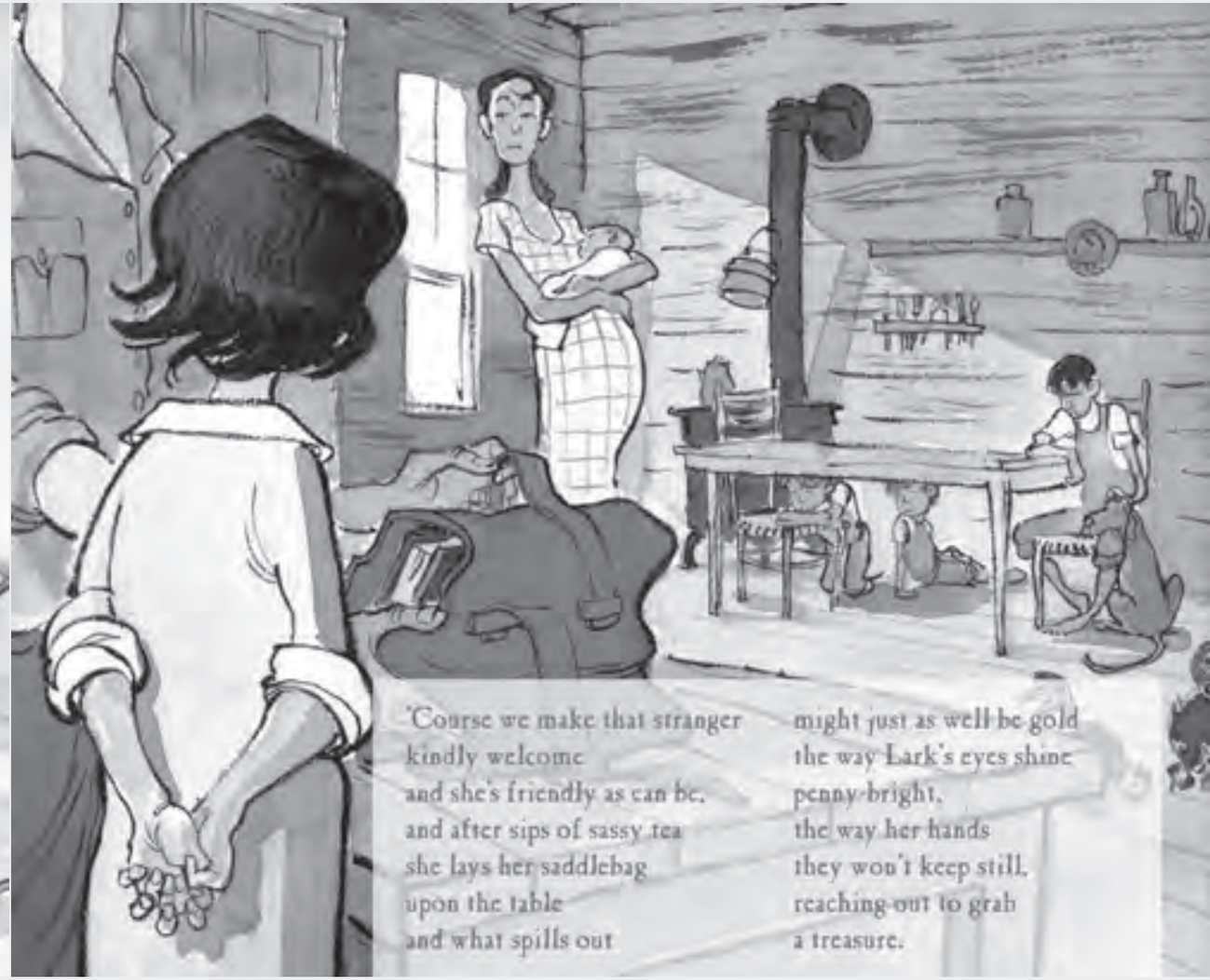


That Book Woman

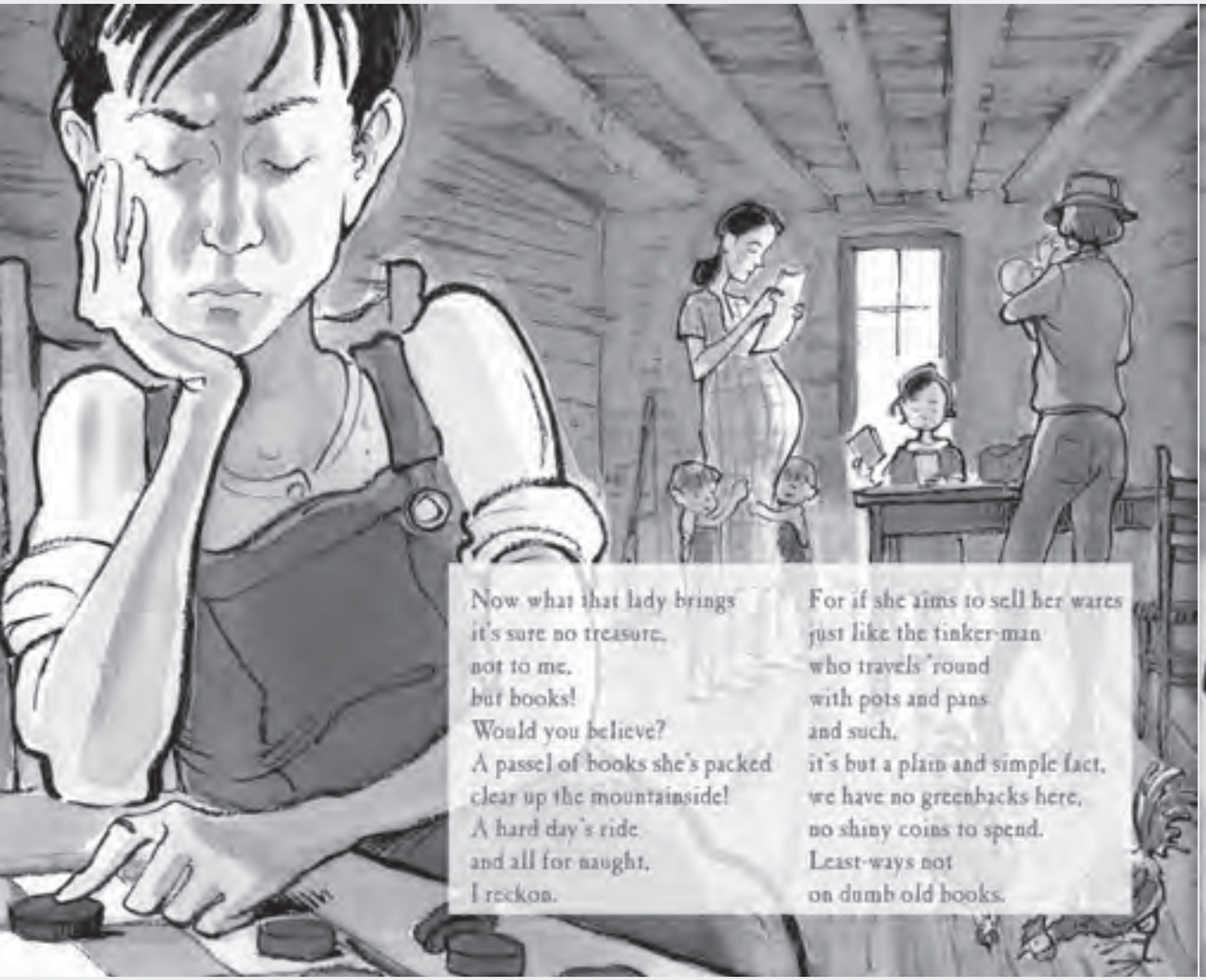
And I can bring the cow home too
come evening-time,
which is right handy,
seeing as how
my sister Lark
would keep her nose
a-twixt the pages of a book
daybreak to dusky dark
if Mama would allow.
The readenest child
you ever did see—
that's what Pap says

Not me.
I was not born
to sit so stoney-still
a-staring at some chicken scratch.
And do not fancy it one bit
when Lark plays Teacher—
the onliest school a jillion miles
back down the creek.
And even Lark can hardly
spread her wings and fly.
So now she aims
to school us herself.
But me, I am no scholar-boy.

That Book Woman

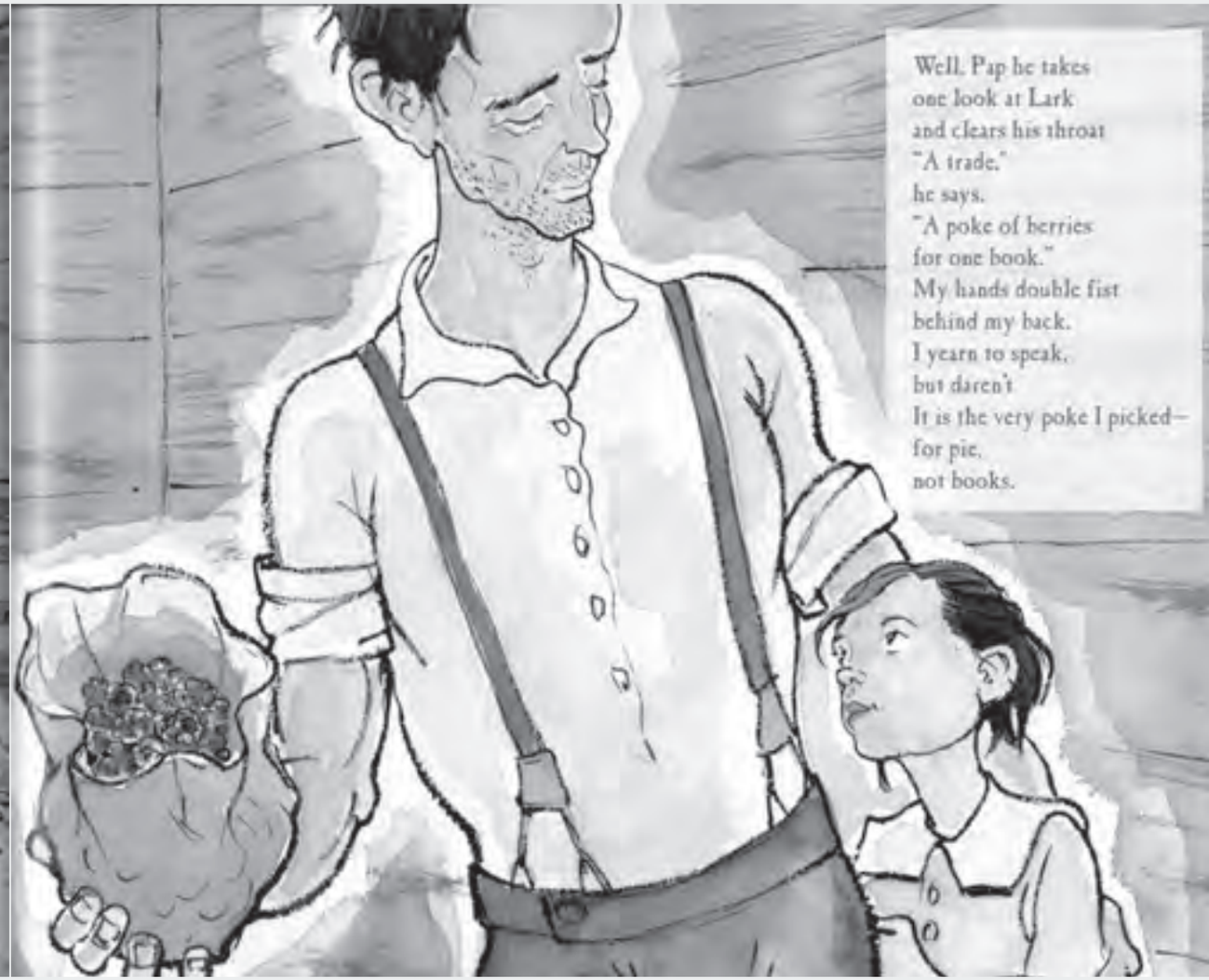


That Book Woman



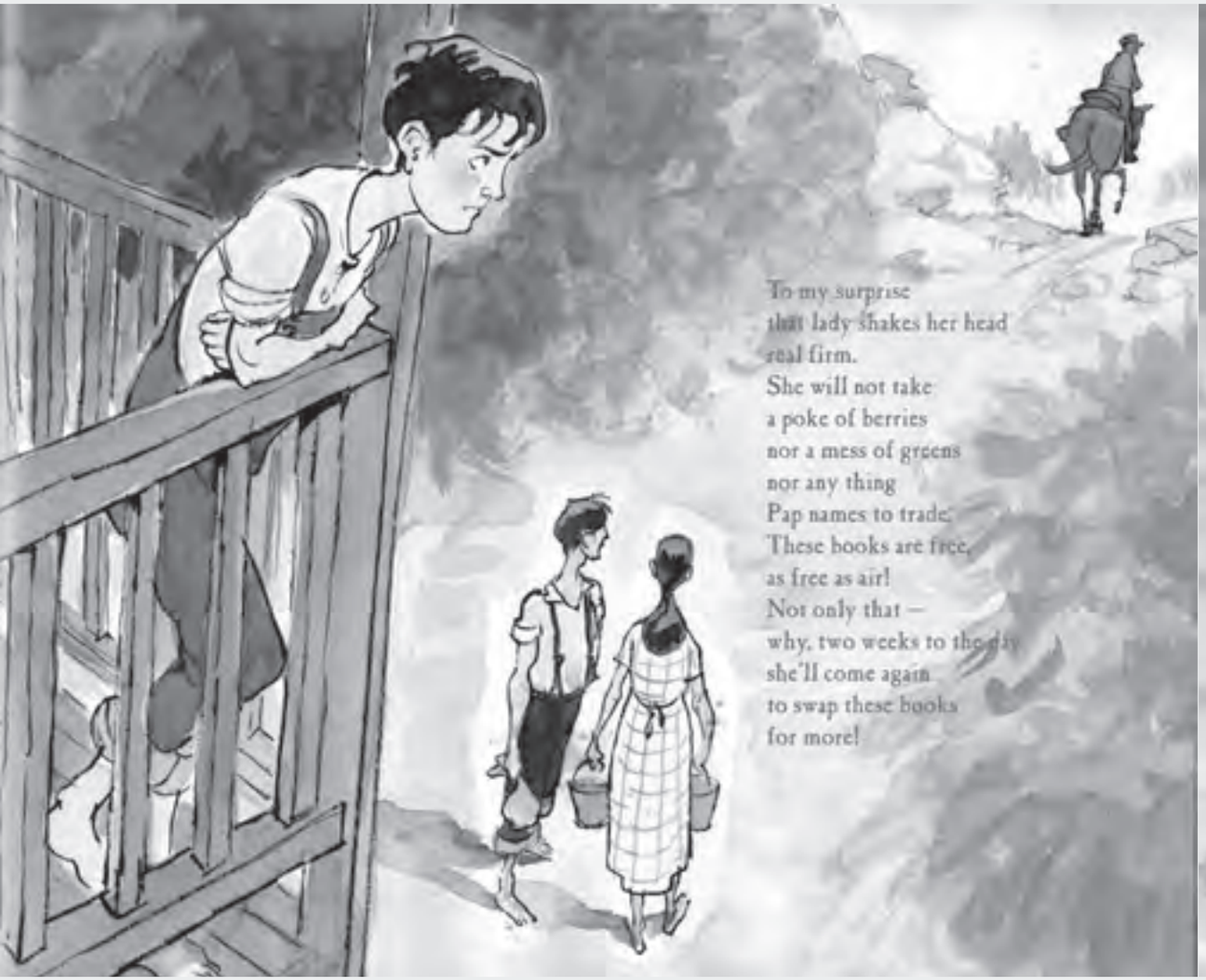
Now what that lady brings
it's sure no treasure,
not to me,
but books!
Would you believe?
A passel of books she's packed
clear up the mountainside!
A hard day's ride
and all for naught,
I reckon.

For if she aims to sell her wares
just like the tinker-man
who travels 'round
with pots and pans
and such,
it's but a plain and simple fact,
we have no greenbacks here,
no shiny coins to spend.
Least-ways not
on dumb old books.

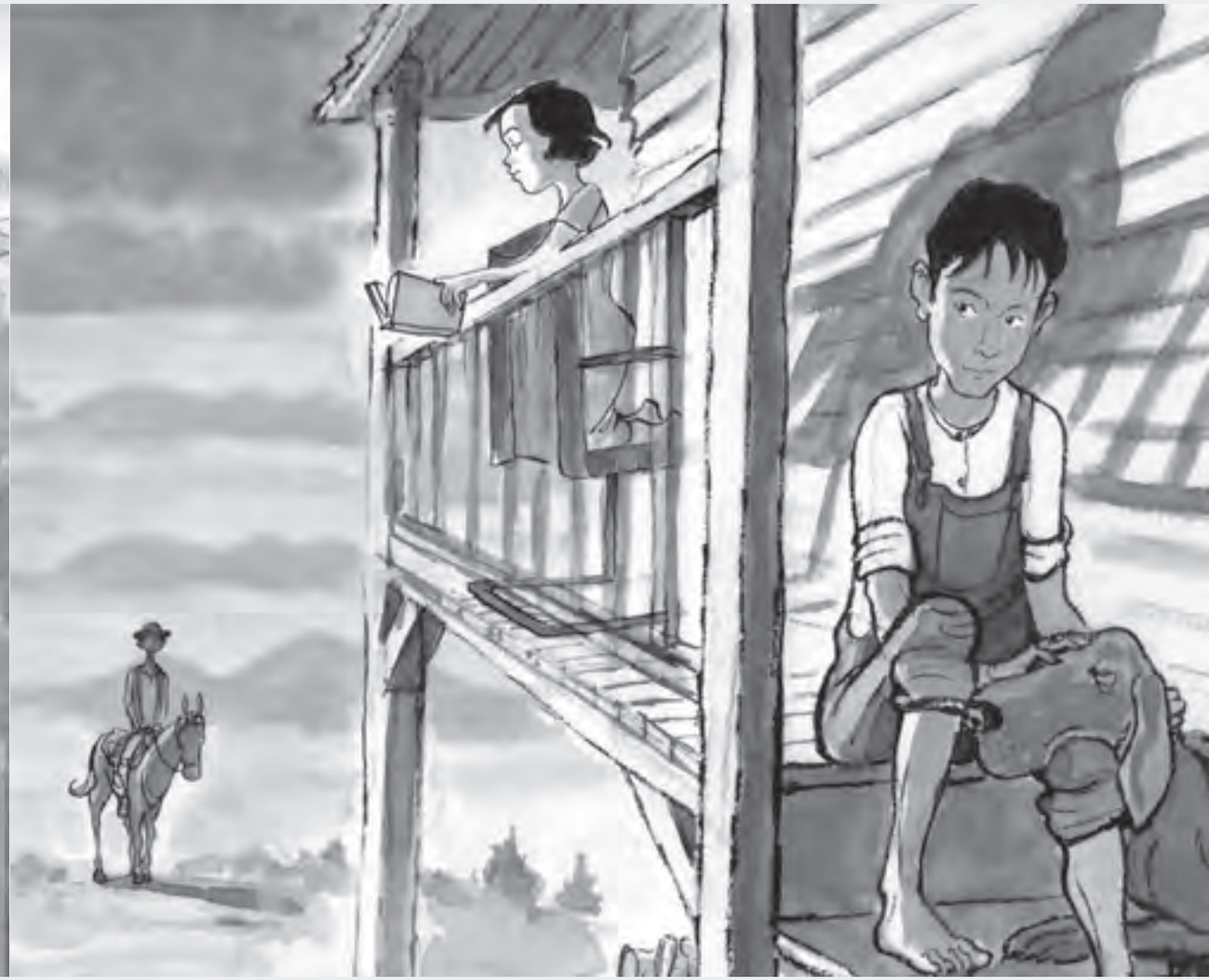


Well, Pap he takes
one look at Lark
and clears his throat
"A trade,"
he says.
"A poke of berries
for one book."
My hands double fist
behind my back.
I yearn to speak,
but daren't
It is the very poke I picked—
for pie,
not books.

That Book Woman



To my surprise
that lady shakes her head
real firm.
She will not take
a poke of berries
nor a mess of greens
nor any thing
Pap names to trade.
These books are free,
as free as air!
Not only that —
why, two weeks to the day
she'll come again
to swap these books
for more!



That Book Woman

Comes on a time
the world turns white
as Granpap's beard.
The wind it shrieks
like bobcats do
deep inside the dark of night.
So here we sit
tucked 'round the fire,
no thought to howdy-do's this
Why, even critters of the wild
will keep a-hid
come snow like this.

That Book Woman

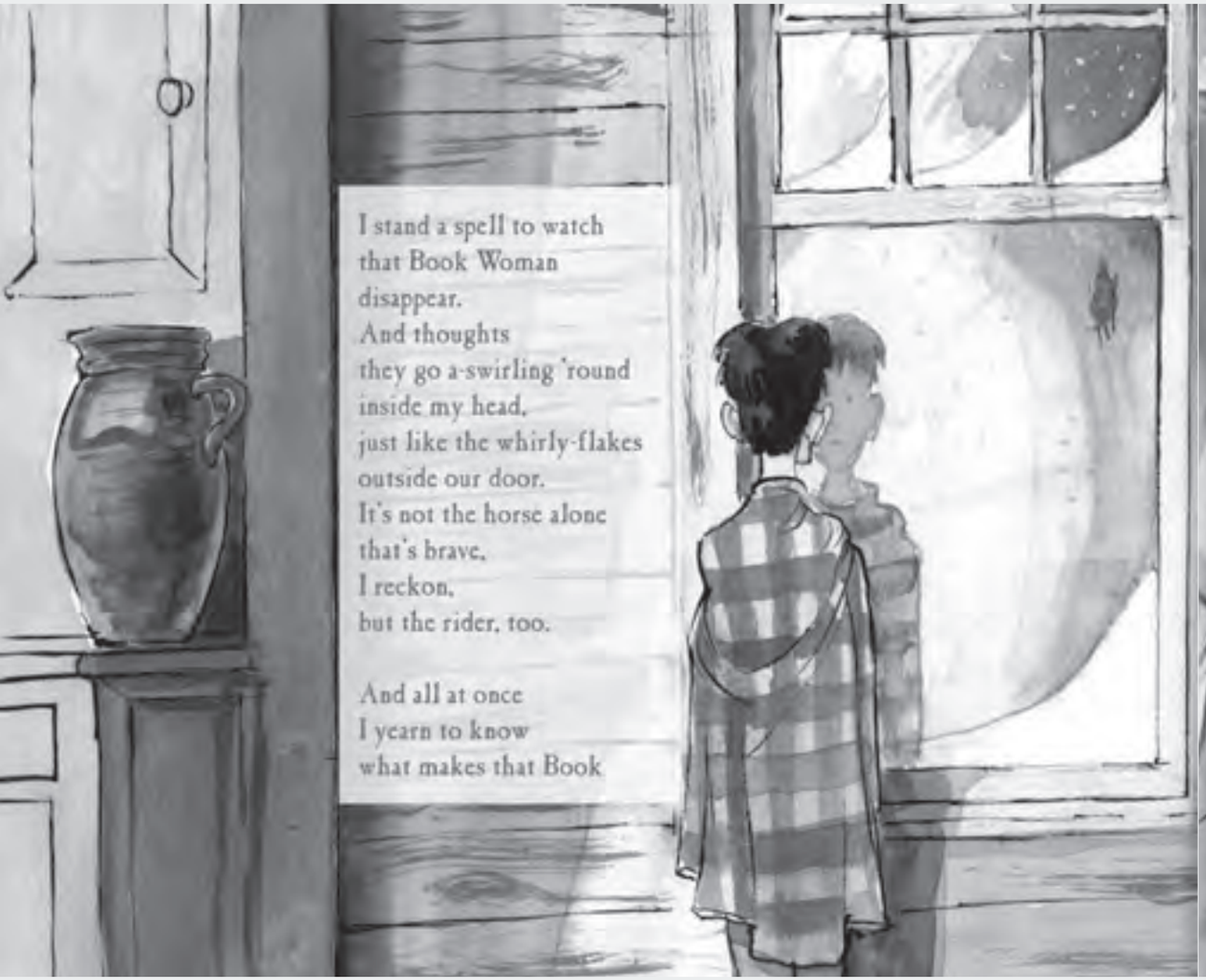
Now me,
I do not care one hoot
for what that Book Woman
has carried 'round,
and it would not bother me
at all
if she forgot the way
back to our door.
But here she'll come
right through the rain
and fog
and cold.

That horse of hers
sure must be brave,
I reckon.

That Book Woman

But sakes alive —
we hear a
tap tap tap
upon the window-glass.
And there she be —
wrapped tip to toe!
She makes her trade
right through the crack
to keep us folks
from catching cold.
And when Pap bids
her stay the night,
she only shakes her head.
"My horse will see me home,"
she says.

That Book Woman



That Book Woman

Pap says it's written
in the signs
how long or short
the winter stays.
This year the signs
they all foretold
of deepest snow,
of cold eternal.
And even though
most days
we're tight as toes
pinched into boughten shoes,
I do not mind.
A puzzlement,
I know,
but true.

That Book Woman

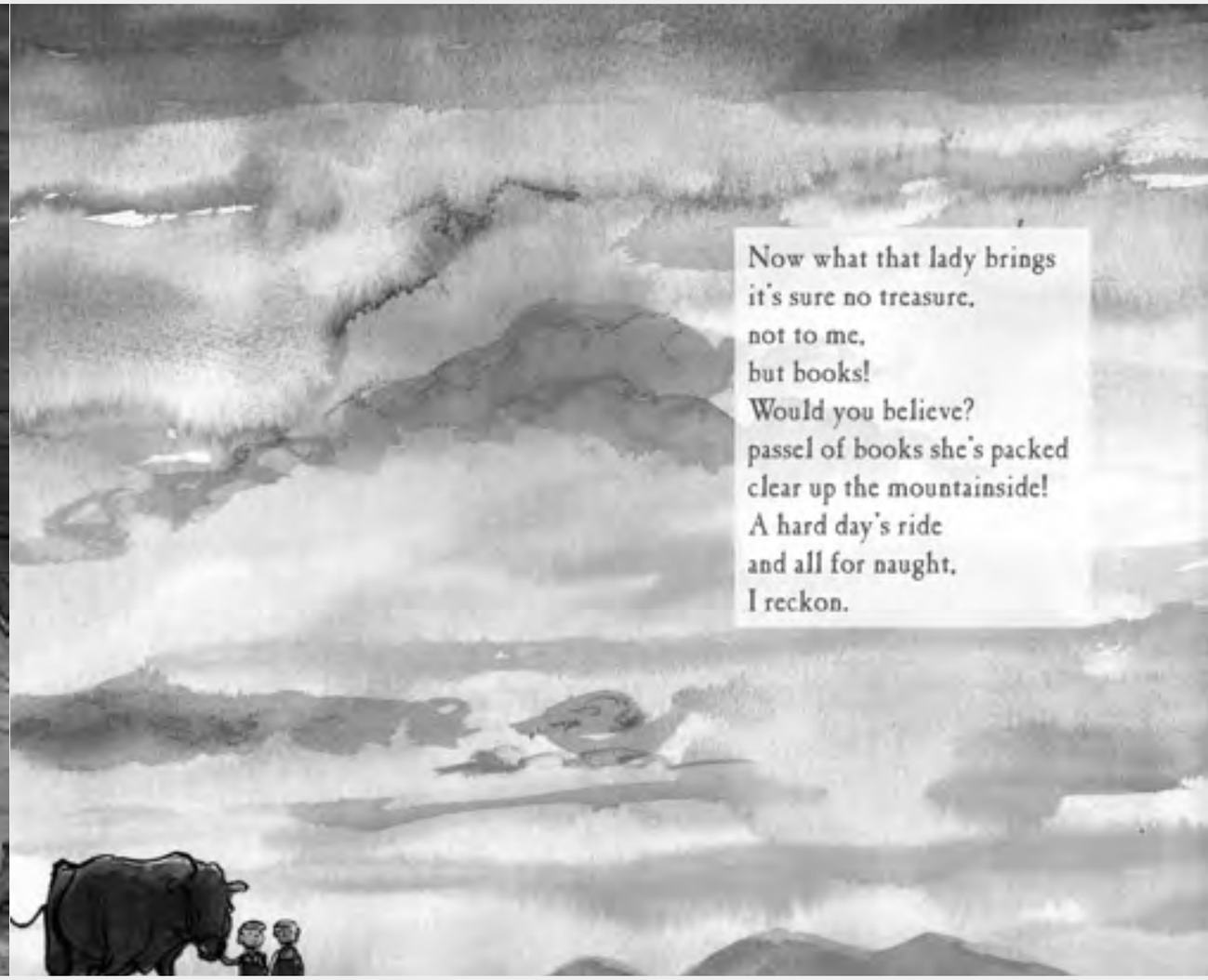
It's nigh on spring
before that Book Woman
can stop to visit a spell.
And Mama makes a gift —
the only precious thing she can
her recipe for berry pie,
which is the best grub earthly.
"Not much, I know,
for all your trouble,"
Mama says,
and then her voice
goes low with pride,
"and for making
two readers outta one."

That Book Woman

I duck my head
and wait until the very last
to speak my mind:
"Wish there was something
I could gift you too."
That Book Woman
turns to look at me
with big dark eyes.
"Come here, Cal,"
she says real gentle,
and I come close.
"Read me something."
I open up the book I'm holding,
a new one brought
this very day.
Just chicken scratch.
I used to figure,
but now I see
what's truly there,
and I read a little out.

"That's gift enough,"
she says,
and smiles so big,
it makes me smile
right back.

That Book Woman



That Book Woman

That Book Woman is a rare and moving tale that honors a special part of American History. This story was inspired by the true and courageous work of Pack Horse Librarians, who were known as 'Book Women' in the Appalachian Mountains of Kentucky.

The Pack Horse Library Project was founded in the 1930s in order to bring books to remote regions where there were few schools and no libraries. High in the hills of Kentucky, roads were just often creek beds or rough trails. A Book Woman would travel, by horse or mule, the same arduous route every two weeks, carrying a load of books—in good weather and in bad. To show their gratitude for what came "free as air", a family might make a gift from what little they had: vegetables, wildflowers, berries, or cherished recipes passed down through generations.

While there were a few men among the Pack Horse Librarians, the jobs were mainly filled by women, in a time when most people felt that "a woman's work was in the home." The Book Women were remarkable in their resilience and their dedication. They were paid very little, but they were proud of what they did: bringing the outside world to the people of Appalachia, and sometimes making readers out of those who had never seen much use for "chicken scratch".

In Kentucky creek beds and trails eventually became roads. Horses and mules gave way to the kind of Bookmobiles that still exist today All across the country dedicated librarians continue to bring books to folks who need them.

Your Elusive Creative Genius

Elizabeth Gilbert

I am a writer. Writing books is my profession but it's more than that, of course. It is also my great lifelong love and fascination. And I don't expect that that's ever going to change. But, that said, something kind of peculiar has happened recently in my life and in my career, which has caused me to have to recalibrate my whole relationship with this work. And the peculiar thing is that I recently wrote this book, this memoir called *Eat, Pray, Love* which, decidedly unlike any of my previous books, went out in the world for some reason, and became this big, mega-sensation, international bestseller thing. The result of which is that everywhere I go now, people treat me like I'm doomed. Seriously—doomed, doomed! Like, they come up to me now, all worried, and they say, "Aren't you afraid you're never going to be able to top that? Aren't you afraid you're going to keep writing for your whole life and you're never again going to create a book that anybody in the world cares about at all, ever again?"

So that's reassuring, you know. But it would be worse, except for that I happen to remember that over 20 years ago, when I was a teenager, when I first started telling people that I wanted to be a writer, I was met with this same sort of fear-based reaction. And people would say, "Aren't you afraid you're never going to have any success? Aren't you afraid the humiliation of rejection will kill you? Aren't you afraid that you're going to work your whole life at this craft and nothing's ever going to come of it and you're going to die on a scrap heap of broken dreams with your mouth filled with bitter ash of failure?"

Like that, you know.

The answer—the short answer to all those questions is, "Yes!" Yes, I'm afraid of all those things. And I always have been. And I'm afraid of many, many more things besides that people can't even guess at, like seaweed and other things that are scary. But, when it comes to writing, the thing that I've been sort of thinking about lately, and wondering about lately, is why? You know, is it rational? Is it logical that anybody should be expected to be afraid of the work that they feel they were put on this Earth to do. And what is it specifically about creative ventures that seems to make us really nervous about each other's mental health in a way that other careers kind of don't do, you know? Like my dad, for example, was a chemical engineer and I don't recall once in his 40 years of chemical engineering anybody asking him if he was afraid to be a chemical engineer, you know? "That chemical-engineering block, John, how's it going?" It just didn't come up like that, you know? But to be fair, chemical engineers as a group haven't really earned a reputation over the centuries for being alcoholic manic-depressives.

We writers, we kind of do have that reputation, and not just writers, but creative people across all genres, it seems, have this reputation for being enormously mentally unstable. And all you have to do is look at the very grim death count in the 20th century alone, of really magnificent creative minds who died young and often at their own hands, you know? And even the ones who didn't literally commit suicide seem to be really undone by their gifts, you know. Norman Mailer, just before he died, last interview, he said, "Every one of my books has killed me a little more." An extraordinary statement to make about your life's work. But we don't even blink when we hear somebody say this, because we've heard that kind of stuff for so long and somehow we've completely internalized and accepted collectively this notion that creativity and suffering are somehow inherently linked and that artistry, in the end, will always ultimately lead to anguish.

And the question that I want to ask everybody here today is: are you guys all cool with that idea? Are you comfortable with that? Because you look at it even from an inch away and, you know—I'm not at all comfortable with that assumption. I think it's odious. And I also think it's dangerous, and I don't want to see it perpetuated into the next century. I think it's better if we encourage our great creative minds to live.

And I definitely know that, in my case—in my situation—it would be very dangerous for me to start sort of leaking down that dark path of assumption, particularly given the circumstance that I'm in right now in my career. Which is—you know, like check it out, I'm pretty young, I'm only about 40 years old. I still have maybe another four decades of work left in me. And it's exceedingly likely that anything I write from this point forward is going to be judged by the world as the

work that came after the freakish success of my last book, right? I should just put it bluntly, because we're all sort of friends here now -- it's exceedingly likely that my greatest success is behind me. So Jesus, what a thought! That's the kind of thought that could lead a person to start drinking gin at nine o'clock in the morning, and I don't want to go there.

I would prefer to keep doing this work that I love.

And so, the question becomes, how? And so, it seems to me, upon a lot of reflection, that the way that I have to work now, in order to continue writing, is that I have to create some sort of protective psychological construct, right? I have to sort of find some way to have a safe distance between me, as I am writing, and my very natural anxiety about what the reaction to that writing is going to be, from now on. And, as I've been looking, over the last year, for models for how to do that, I've been sort of looking across time, and I've been trying to find other societies to see if they might have had better and saner ideas than we have about how to help creative people sort of manage the inherent emotional risks of creativity.

And that search has led me to ancient Greece and ancient Rome. So stay with me, because it does circle around and back. But, ancient Greece and ancient Rome —people did not happen to believe that creativity came from human beings back then, OK? People believed that creativity was this divine attendant spirit that came to human beings from some distant and unknowable source, for distant and unknowable reasons. The Greeks famously called these divine attendant spirits of creativity 'daemons'. Socrates, famously, believed that he had a daemon who spoke wisdom to him from afar.

The Romans had the same idea, but they called that sort of disembodied creative spirit a genius. Which is great, because the Romans did not actually think that a genius was a particularly clever individual. They believed that a genius was this, sort of magical divine entity, who was believed to literally live in the walls of an artist's studio, kind of like Dobby the house elf, and who would come out and sort of invisibly assist the artist with their work and would shape the outcome of that work.

So brilliant—there it is, right there, that distance that I'm talking about—that psychological construct to protect you from the results of your work. And everyone knew that this is how it functioned, right? So the ancient artist was protected from certain things, like, for example, too much narcissism, right? If your work was brilliant, you couldn't take all the credit for it, everybody knew that you had this disembodied genius who had helped you. If your work bombed, not entirely your fault, you know? Everyone knew your genius was kind of lame.

And this is how people thought about creativity in the West for a really long time. And then the Renaissance came and everything changed, and we had this big idea, and the big idea was, let's put the individual human being at the center of the universe above all gods and mysteries, and there's no more room for mystical creatures who take dictation from the divine. And it's the beginning of rational humanism, and people started to believe that creativity came completely from the self of the individual. And for the first time in history, you start to hear people referring to this or that artist as being a genius, rather than having a genius.

And I got to tell you, I think that was a huge error. You know, I think that allowing somebody, one mere person to believe that he or she is like, the vessel, you know, like the font and the essence and the source of all divine, creative, unknowable, eternal mystery is just a smidge too much responsibility to put on one fragile, human psyche. It's like asking somebody to swallow the sun. It just completely warps and distorts egos, and it creates all these unmanageable expectations about performance. And I think the pressure of that has been killing off our artists for the last 500 years.

And, if this is true, and I think it is true, the question becomes, what now? Can we do this differently? Maybe go back to some more ancient understanding about the relationship between humans and the creative mystery. Maybe not. Maybe we can't just erase 500 years of rational humanistic thought in one 18 minute speech. And there are probably people in this audience who would raise really legitimate scientific suspicions about the notion of, basically, fairies who follow people around rubbing fairy juice on their projects and stuff. I'm not, probably, going to bring you all along with me on this.

But the question that I kind of want to pose is—you know, why not? Why not think about it this way? Because it makes as much sense as anything else I have ever heard in terms of explaining the utter maddening capriciousness of the creative process. A process which, as anybody who has ever tried to make something —which is to say basically everyone here—knows does not always behave rationally. And, in fact, can sometimes feel downright paranormal.

I had this encounter recently where I met the extraordinary American poet Ruth Stone, she's been a poet her entire life and she told me that when she was growing up in rural Virginia, she would be out working in the fields, and she said she would feel and hear a poem coming at her from over the landscape. And she said it was like a thunderous train of air. And it would come barreling down at her over the landscape. And she felt it coming, because it would shake the earth under her feet. She knew that she had only one thing to do at that point, and that was to, in her words, "run like hell". And she would run like hell to the house and she would be getting chased by this poem, and the whole deal was

that she had to get to a piece of paper and a pencil fast enough so that when it thundered through her, she could collect it and grab it on the page. And other times she wouldn't be fast enough, so she'd be running and running, and she wouldn't get to the house and the poem would barrel through her and she would miss it and she said it would continue on across the landscape, looking, as she put it "for another poet". And then there were these times—this is the piece I never forgot— she said that there were moments where she would almost miss it, right? So, she's running to the house and she's looking for the paper and the poem passes through her, and she grabs a pencil just as it's going through her, and then she said, it was like she would reach out with her other hand and she would catch it. She would catch the poem by its tail, and she would pull it backwards into her body as she was transcribing on the page. And in these instances, the poem would come up on the page perfect and intact but backwards, from the last word to the first.

So when I heard that I was like—that's uncanny, that's exactly what my creative process is like.

That's not at all what my creative process is -- I'm not the pipeline! I'm a mule, and the way that I have to work is I have to get up at the same time every day, and sweat and labor and barrel through it really awkwardly. But even I, in my mulishness, even I have brushed up against that thing, at times. And I would imagine that a lot of you have too. You know, even I have had work or ideas come through me from a source that I honestly cannot identify. And what is that thing? And how are we to relate to it in a way that will not make us lose our minds, but, in fact, might actually keep us sane?

And for me, the best contemporary example that I have of how to do that is the musician Tom Waits, who I got to interview several years ago on a magazine assignment. And we were talking about this, and you know, Tom, for most of his life, he was pretty much the embodiment of the tormented contemporary modern artist, trying to control and manage and dominate these sort of uncontrollable creative impulses that were totally internalized.

But then he got older, he got calmer, and one day he was driving down the freeway in Los Angeles, and this is when it all changed for him. And he's speeding along, and all of a sudden he hears this little fragment of melody, that comes into his head as inspiration often comes, elusive and tantalizing, and he wants it, it's gorgeous, and he longs for it, but he has no way to get it. He doesn't have a piece of paper, or a pencil, or a tape recorder.

So he starts to feel all of that old anxiety start to rise in him like, "I'm going to lose this thing, and I'll be be haunted by this song forever. I'm not good enough, and I can't do it." And instead of panicking, he just stopped. He just stopped that whole mental process and he did something completely novel. He just looked up at the sky, and he said, "Excuse me, can you not see that I'm driving?"

"Do I look like I can write down a song right now? If you really want to exist, come back at a more opportune moment when I can take care of you. Otherwise, go bother somebody else today. Go bother Leonard Cohen."

And his whole work process changed after that. Not the work, the work was still oftentimes as dark as ever. But the process, and the heavy anxiety around it was released when he took the genie, the genius out of him where it was causing nothing but trouble, and released it back where it came from, and realized that this didn't have to be this internalized, tormented thing. It could be this peculiar, wondrous, bizarre collaboration, kind of conversation between Tom and the strange, external thing that was not quite Tom.

When I heard that story, it started to shift a little bit the way that I worked too, and this idea already saved me once. It saved me when I was in the middle of writing *Eat, Pray, Love*, and I fell into one of those sort of pits of despair that we all fall into when we're working on something and it's not coming and you start to think this is going to be a disaster, the worst book ever written. Not just bad, but the worst book ever written. And I started to think I should just dump this project. But then I remembered Tom talking to the open air and I tried it. So I just lifted my face up from the manuscript and I directed my comments to an empty corner of the room. And I said aloud, "Listen you, thing, you and I both know that if this book isn't brilliant that is not entirely my fault, right? Because you can see that I am putting everything I have into this, I don't have any more than this. If you want it to be better, you've got to show up and do your part of the deal. But if you don't do that, you know what, the hell with it. I'm going to keep writing anyway because that's my job. And I would please like the record to reflect today that I showed up for my part of the job."

Because in the end it's like this, OK—centuries ago in the deserts of North Africa, people used to gather for these moonlight dances of sacred dance and music that would go on for hours and hours, until dawn. They were always magnificent, because the dancers were professionals and they were terrific, right? But every once in a while, very rarely, something would happen, and one of these performers would actually become transcendent. And I know you know what I'm talking about, because I know you've all seen, at some point in your life, a performance like this. It was like time would stop, and the dancer would sort of step through some kind of portal and he wasn't doing anything different than he had ever done, 1,000 nights before, but everything would align. And all of a sudden, he would no longer appear to be merely human. He would be lit from within, and lit from below and all lit up on fire with divinity.

And when this happened, back then, people knew it for what it was, you know, they called it by its name. They would put their hands together and they would start to chant, "Allah, Allah, Allah, God, God, God." That's God, you know. Curious historical footnote: when the Moors invaded southern Spain, they took this custom with them and the pronunciation changed over the centuries from "Allah, Allah, Allah," to "Olé, olé, olé," which you still hear in bullfights and in flamenco dances. In Spain, when a performer has done something impossible and magic, "Allah, olé, olé, Allah, magnificent, bravo," incomprehensible, there it is—a glimpse of God. Which is great, because we need that.

But, the tricky bit comes the next morning, for the dancer himself, when he wakes up and discovers that it's Tuesday at 11 a.m., and he's no longer a glimpse of God. He's just an aging mortal with really bad knees, and maybe he's never going to ascend to that height again. And maybe nobody will ever chant God's name again as he spins, and what is he then to do with the rest of his life? This is hard. This is one of the most painful reconciliations to make in a creative life. But maybe it doesn't have to be quite so full of anguish if you never happened to believe, in the first place, that the most extraordinary aspects of your being came from you. But maybe if you just believed that they were on loan to you from some unimaginable source for some exquisite portion of your life to be passed along when you're finished, with somebody else. And, you know, if we think about it this way, it starts to change everything.

This is how I've started to think, and this is certainly how I've been thinking in the last few months as I've been working on the book that will soon be published, as the dangerously, frighteningly over-anticipated follow up to my freakish success.

And what I have to sort of keep telling myself when I get really psyched out about that is don't be afraid. Don't be daunted. Just do your job. Continue to show up for your piece of it, whatever that might be. If your job is to dance, do your dance. If the divine, cockeyed genius assigned to your case decides to let some sort of wonderment be glimpsed, for just one moment through your efforts, then "Olé!" And if not, do your dance anyhow. And "Olé!" to you, nonetheless. I believe this and I feel that we must teach it. "Olé!" to you, nonetheless, just for having the sheer human love and stubbornness to keep showing up.

The author of 'Eat, Pray, Love' and 'Big Magic: Creative Living beyond Fear', Elizabeth Gilbert has thought long and hard about some interesting topics. Her fascinations are genius, creativity and how we get in our own way when it comes to both.

Transcript of a TED Talk delivered in 2009. It may be viewed through the link:
https://www.ted.com/talks/elizabeth_gilbert_on_genius

And another TED Talk on 'Success, Failure and the Drive to Keep Creating' through the link:
https://www.ted.com/talks/elizabeth_gilbert_success_failure_and_the_drive_to_keep_creating

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